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JULY 1999

SUMMARY OF THE 1998 U.S. NORTH AND SOUTH PACIFIC ALBACORE TROLL FISHERIES

By

John Childers and Forrest R. Miller

ADMINISTRATIVE REPORT LJ-99-09

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SUMMARY OF THE 1998 U.S. NORTH AND SOUTH PACIFIC ALBACORE TROLL FISHERIES[1]

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INTRODUCTION

North Pacific albacore (*Thunnus alalunga*) are taken by fisheries from various nations (Table 1). Japan is the largest harvester, annually taking 74% of the North Pacific albacore landed by all nations, while the U.S. annually takes less than 22%. U.S. troll vessels have fished for albacore in the North Pacific since the early 1900's (Clemens and Craig, 1965). The collection of logbook and length-frequency data from the U.S. North Pacific albacore troll fishery began in 1951. The agencies involved in the voluntary collection of logbook, length-frequency, and landing information from the U.S. albacore troll fisheries are the La Jolla and Honolulu laboratories of the Southwest Fisheries Science Center (SWFSC) of the National Marine Fisheries Service (NMFS), Western Fishboat Owners Association (WFOA), Pacific States Marine Fisheries Commission (PSMFC), and the state fisheries agencies of California, Oregon, and Washington. Beginning in 1971, cooperative surveys between NMFS and the American Fishermen's Research Foundation (AFRF) led to the expansion of albacore fishing areas to areas north of Hawaii and west of the International Dateline (Laurs, Lynn, Nishimoto, 1975). In recent years the North Pacific season has begun as early as mid-April in areas northwest of Midway Island. In July and August, the fleet fishes near 45°N, 150°W and along the West Coast from Vancouver Island to Southern California. Fishing can continue into November if weather permits and sufficient amounts of albacore remain available to troll gear.

South Pacific albacore are also caught by a variety of nations (Table 2). Japan harvests the largest proportion of albacore caught annually in the South Pacific (41% on average). The U.S. annually takes 2% of the total landings of South Pacific albacore. Exploratory troll fishing for albacore in areas east of New Zealand in 1986 resulted in the development of the U.S. South Pacific troll fishery (Laurs et al., 1987). The collection of logbook, landing, and length-frequency data from the U.S. South Pacific fishery began in 1987. This fishery takes place during the austral summer months (December through April). U.S. troll vessels that participate in the South Pacific fishery depart from the U.S. West Coast or Hawaii after the end of the North Pacific season and travel to American Samoa or French Polynesia to prepare for the South Pacific season. Fishing areas for South Pacific albacore extend from the Tasman Sea to approximately 110°W between 25°S and 45°S. At the end of the season (in March or April),

most troll vessels unload in American Samoa, Fiji, or Tahiti then travel to Hawaii or the U.S. West Coast to prepare for the next North Pacific fishing season.

This report presents summaries of the logbook (catch/effort), landing and length-frequency information collected from the 1998 North Pacific and the 1997-98 South Pacific albacore seasons. Data from the 1997 North Pacific season, 1996-97 South Pacific season, and from non-U.S. albacore fisheries (where available) are included for comparison.

DATA COLLECTED

Total annual landing data from the various fisheries that catch albacore in the Pacific Ocean are available from 1952 to 1998 (Tables 1 and 2). The SWFSC collects landing, logbook and length-frequency information from the two U.S. Pacific albacore troll fisheries and sea surface temperature (SST) information for the North Pacific fishery. Data from direct landings and at-sea transshipments are provided by the WFOA and collected from state landing receipts submitted by fish buyers and canneries. Daily catch and effort data are obtained from completed copies of the *U.S. Pacific Albacore Logbook*, that are voluntarily submitted by fishermen, or completed by port samplers who collect the information from cooperating fishermen. Approximately 800 logbooks were distributed to albacore fishermen for the 1998 North Pacific and the 1997-98 South Pacific albacore seasons. Length-frequency data from the 1998 North Pacific season were collected by port samplers in the ports of Westport and Ilwaco, Washington, Astoria and Newport, Oregon, Crescent City, Eureka, and Terminal Island, California and Pago Pago, American Samoa.

North Pacific SST data recorded from commercial transport ships, fishing vessels, and research vessels, were compiled into monthly means and computer-analyzed. Contours of SSTs were drawn with a resolution of 1° latitude-longitude and compared with the general catch areas of North Pacific albacore (Figures 2a through 2g). Analysis of SSTs shows the distribution of isotherms and the locations of ocean fronts (areas of north-south close spacing of isotherms). Albacore tend to congregate along these fronts in the North Pacific transition zone (Laurs and Lynn, 1977). Insufficient SST information is available from the areas of the South Pacific fishery (east of New Zealand to 110°W and south of 30°S) to make an analysis possible.

LOGBOOK SAMPLING COVERAGE

Logbook sampling coverage is the ratio of landings from sampled trips (those trips from which logbook data were received) to total landings. Landings from sampled trips in some past seasons are not available. For consistent comparison of sampling coverage between current and past seasons, sampled landings are estimated by multiplying numbers of fish caught (recorded in logbooks) by the average weight of those fish and summing these estimates from sampled logbooks.

A total of 285 trips (of approximately 2,500 total trips) were sampled for logbook information during the 1998 North Pacific season. Sampled landings total 5,540 metric tons (t), resulting in a logbook sampling coverage rate of 38%, slightly lower than 40% in 1997 (Table 3).

Logbook data from the 1997-98 South Pacific season were collected from 34 trips of the 39 trips made by U.S. troll vessels. These sampled trips landed 1,181 t, resulting in a logbook sampling coverage of 67%, compared to 74% for the 1996-97 season (Table 4).

LENGTH-FREQUENCY SAMPLING COVERAGE

Length-frequency sampling coverage is the ratio of the number of fish sampled (measured) to the total number of fish landed for the season. The total number of fish landed for the season is estimated by dividing total landings by the average weight of fish landed. The estimated total number of fish landed during the 1998 North Pacific season is 2,253,796 fish. A total of 16,505 albacore were measured, resulting in a length-frequency sampling coverage of 0.7%, significantly lower than 2.0% coverage in the 1997 North Pacific season (Table 3). Long delays in unloading and selling catches hampered samplers' efforts to obtain length-frequency samples and resulted in a decreased sampling coverage rate.

Port samplers in Pago Pago, American Samoa, collected length-frequency data from the 1997-98 South Pacific albacore fishery. During the 1997-98 South Pacific albacore troll season, the canneries in American Samoa were oversupplied with albacore. Most of the troll fleet sold their catch in Fiji where no length-frequency sampling was done. Samplers in American Samoa were able to measure 200 albacore from two troll vessel landings, resulting in a length-frequency sampling coverage rate of 0.1%. The coverage rate in the 1996-97 season is 0.7% (Table 4).

TOTAL EFFORT AND CATCH

Fishing effort in the albacore troll fisheries is measured in number of fishing days. Total fishing effort for the U.S. albacore troll fisheries is estimated by dividing total landings (in pounds) by catch-per-unit effort (in numbers of fish per day) then dividing by average weight (in pounds). Troll vessels fished an estimated 19,994 days during the 1998 North Pacific albacore season, a 55% decrease in effort from 44,356 days fished in 1997 (Table 3). This large decrease in effort can be attributed to the fact that much of the fleet spent long periods in port, with full loads, unable to find buyers. Total landings from the 1998 North Pacific albacore season increased slightly to 14,682 t from 14,151 t landed in 1997. Total landings might have been much higher if albacore fishermen could have sold their catches faster. Estimated albacore landings by non-U.S. fisheries that target albacore in the North Pacific are listed in Table 1.

Total fishing effort for the 1997-98 South Pacific albacore fishery is estimated to be 5,379 days, an increase of 85% from 2,910 days fished in the 1996-97 season (Table 4). Total U.S. landings for 1997-98 increased slightly to 1,764 t from 1,403 t landed in 1996-97. Estimated landings by non-U.S. fisheries targeting albacore in the South Pacific are listed in Table 2.

DISTRIBUTION OF CATCHES AND SSTs

Albacore catches recorded during the 1998 North Pacific season extend from the West Coast to 170°E, between approximately 30°N and 50°N. Areas of high catch indicate productive regions where albacore are available to troll gear. Based on sampled logbook data, three high catch areas were centered at 37°N, 176°W, 42°N, 149°W and 46°N, 125°W (Figure 1). High and low catch areas recorded by U.S. troll vessels for each month of the 1998 North

Pacific season are shaded on corresponding monthly (SST) contour charts in Figures 2a through 2g. These figures show the relationship between fishing areas, SST fronts and isotherm patterns. The area of highest catch in May was located at 37°N, 176°W (Figure 2a). SSTs in this area ranged from 15°C to 16°C (59°F to 61°F) and were normal ("normal" refers to the long-term mean averaged over the past 20 years). The area of highest albacore catches in June extended between 35°N and 39°N, from 160°W to 176°W where SSTs ranged from 16°C to 20°C (61°F to 68°F) and were 1°C below normal (Figure 2b). During July, the most productive fishing occurred between 41°N and 43°N from 147°W to 151°W in SSTs ranging from 15°C to 18°C (59°F to 65°F, Figure 2c), which were near normal. High catches in August shifted slightly westward between 43°N to 44°N from 148°W to 151°W (Figure 2d). SSTs ranged from 15°C to 17°C (59°F to 63°F) in this area and were 1°C below normal while they were 1°C above normal in the coastal fishing areas. Overall fishing effort declined greatly after August as fishermen were trying to sell previous months' catches. In September, offshore catches were scattered from 45°N to 47°N, between 138°W and 140°W. The highest albacore catches along the coast were distributed from 43°N to 47°N between 125°W and 126°W (Figure 2e). SSTs were 1°C to 2°C above normal along the West Coast. Very little catch data is available from October. The area of highest catch was centered at 44°N, 125°W in 15°C to 18°C (59°F to 65°F) water. The SST was 1°C below normal in the offshore area while it was 1°C above normal at 26°N (Figure 2f). Catches reported in November were centered at 38°N, 157°W. where SSTs were 15°C (59°F).

Albacore catches recorded during the 1997-98 South Pacific season were summarized for the season and year and month by 5° x 5° squares (Figures 3a through 3f). The highest albacore catches of the season are between 35°S and 45°S, from 150°W to 160°W (Figure 3a). Fishing in November 1997 was distributed between 30°S and 40°S, from 170°W to 170°E (Figure 3b). Albacore catches in December 1997 were distributed from New Zealand to 150°W between 30°S and 40°S (Figure 3c). The areas where the most fish were caught in January 1997 are between 35°S and 40°S from 155°W to 160°W (Figure 3d). High catches in February were located between 40°S and 45°S from 155°W to 160°W (Figure 3e). Catches in March spanned from 35°S to 45°S between 150°W and 170° (Figure 3f).

CATCH-PER-UNIT EFFORT

Catch-Per-Unit Effort (CPUE) is used as an indication of relative abundance of albacore available to troll gear, or a measure of fishing success, and is expressed in numbers of fish caught per day of fishing. Catch (in numbers of fish) and effort (in days fished) were summarized (from logbook data) by 10-day, 1°-square strata in which there was at least one day of fishing effort (Kleiber and Perrin, 1991). Average CPUE is calculated as follows:

$$\text{Average CPUE} = \frac{\sum_{n}^{1} \frac{\sum C_i}{\sum E_i}}{n}$$

Where C_i is the total sampled catch in the i^{th} strata, E_i is the total sampled effort in the i^{th} strata, and n is the total number of strata.

CPUE for the North Pacific albacore troll fishery declined by approximately 68% between 1962 and 1977, then remained relatively stable between 1977 and 1989, but has been generally increasing since 1989 (Figure 4). The average CPUE for the 1998 North Pacific season increased to 113 fish per day from 46 fish per day in the 1997 season (Table 3). This increase in CPUE is due to a large reduction of effort due to marketing problems. Much of the fleet remained in port for a large portion of the season, unable to sell their catches.

CPUE for the U.S. South Pacific troll fishery declined between the 1986-87 and 1992-93 seasons (Figure 4). CPUE then peaked at 150 fish per day in 1994-95. The CPUE for the 1997-98 South Pacific season is 53 fish per day compared to 78 fish per day in the 1996-97 season (Table 4).

CPUEs from the 1998 North Pacific season were summarized (averaged) for the season and each month by 1° x 1° squares. The highest CPUEs averaged for the season ranged from 230 to 781 fish per day and were distributed between 171°E and 127°W from 34°N to 46°N (Figure 5a). In May, CPUEs greater than 85 fish per day were distributed between 171°E and 174°W from 35°N to 38°N (Figure 5b). In June, CPUEs from 230 to 781 fish per day were concentrated between 162°W and 176°E from 36°N to 39°N (Figure 5c). The highest CPUEs (between 85 and 781 fish per day) in July were distributed between 145°W and 169°W from 38°N to 46°N (Figure 5d). The highest CPUEs in August were located between 139°W and 154°W from 42°N to 45°N and along the coast between 124°W and 128°W from 43°N to 47°N (Figure 5e). High CPUEs in September were scattered between 125°W and 151°W from 41°N to 47°N (Figure 5f). High CPUEs in October were concentrated between 147°W and 157°W from 38°N to 42°N and between 125°W and 128°W from 42°N to 46°N (Figure 5g). CPUEs between 85 and 230 fish per day were reported for November between 156°W and 158°W from 38°N to 39°N (Figure 5h).

CPUEs for the 1997-98 South Pacific season were summarized (averaged) for the season and year and month by 5° x 5° squares. The highest CPUEs for the 1997-98 season ranged from 101 fish per day to 192 fish per day between 155°W and 160°W from 40°S to 50°S (Figure 6a). CPUEs in November 1997 ranged from 1 to 33 fish per day between 175°E and 170°W from 30°S to 40°S (Figure 6b). CPUEs increased in December 1997 with the highest CPUEs (34 to 100 fish per day) between 150°W and 170°W, from 30°S to 40°S (Figure 6c). The highest CPUEs in January 1998 ranged from 34 to 100 fish per day and were distributed between 140°W and 180° as well as in the Tasman Sea (Figure 6d). In February, CPUEs exceeding 101 fish per day were distributed between 150°W and 160°W from 35°S to 50°S (Figure 6e). CPUEs decreased in March as the season came to a close. CPUEs from 34 to 100 fish per day were located between 150°W and 170°W from 35°S to 45°S (Figure 6f).

LENGTH-FREQUENCIES

Fork lengths of albacore measured during the 1998 North Pacific season ranged from 49 cm (5 lb or 2.4 kg) to 98 cm (42 lb or 19.2 kg) and averaged 68 cm (14 lb or 6.4 kg). The average fork length of sampled albacore from the 1997 season is 70 cm (15.5 lb or 7.0 kg). Two length-frequency modes are evident in the histogram of samples from the 1998 North Pacific

season (Figure 7). The most prominent mode is centered near 65 cm (3 years old). A less prominent mode is centered at 83 cm (5 years old).

Small albacore (less than 49 cm fork lengths) may not be adequately represented in the length-frequency data collected from the 1998 North Pacific fishery due to marketing strategies. Vessels that sell most of their catch to canneries or buying stations (which may pay less for small fish), might release small fish when they are abundant in the catches. Troll vessels that sell fish direct to the public (or other markets where small fish are preferred) might retain more small fish.

Albacore fork lengths measured during the 1997-98 South Pacific season range from 56 cm (8 lb or 3.6 kg) to 84 cm (27 lb or 12.1 kg) and average 67 cm (13.5 lb or 5.9 kg). The average fork length of sampled albacore from the 1996-97 season is also 67 cm. At least one significant length-frequency mode is apparent in the histogram of samples from the 1997-98 season (Figure 8). It is centered at 63 cm (3-4 years old). Another, less distinct mode is centered at 72 cm (94-5 years old). It is important to note the small sample size (200 fish) for the length-frequency samples obtained from the 1997-98 South Pacific season.

North Pacific albacore length-weight-age conversions and South Pacific albacore length-weight conversions are taken from "A review of the biology and fisheries for North Pacific albacore (Thunnus alalunga)" by Bartoo and Foreman, 1993. South Pacific albacore length-age conversions are taken from Labelle, et. al., 1993.

SUMMARY

Logbook sampling coverage for the 1998 North Pacific albacore fishery decreased slightly to 38% from 40% in 1997. Length-frequency sampling coverage dropped to 0.7% in 1998 due to problems in obtaining length-frequency samples. Total effort by U.S. troll vessels in 1998 decreased 55% to 19,994 days. U.S. troll vessels landed a total of 14,682 t during the 1998 North Pacific season. The season began in May north of Midway Island and ended in November. Albacore catch locations ranged from the West Coast to 170°E. The highest reported catches during the season were centered at 37°N, 176°W, 42°N, 149°W, and 46°N, 125°W. The most productive fishing areas followed the sub-arctic ocean front delineated by 15°C and 18°C isotherms (59.0°F and 64.4°F, respectively) in the offshore areas and were found near fronts caused by upwelling in coastal areas. The average CPUE for the 1998 season increased from 46 fish per day in 1997 to 113 fish per day. The large increase is attributed to a large decrease in effort as a consequence of vessels being unable to sell their catches during the peak of the season. Season-averaged CPUEs between 230 and 781 fish per day were distributed between 171°E and 127°W from 34°N to 46°N. A total of 16,505 albacore were measured during the 1998 North Pacific season. Fork lengths of sampled albacore range from 49 cm to 98 cm and averaged 68 cm. The histogram of length-frequency samples from the 1998 season show two modes centered at 65 cm, 83 cm. Fish less than 49 cm fork length may not be adequately represented in the North Pacific length-frequency samples due to releasing of small fish.

Logbook sampling coverage for the 1997-98 South Pacific albacore troll fishery declined from 74% in the 1996-97 season to 67%. Length-frequency sampling coverage is 0.1%, since most vessels unloaded in Fiji where no length-frequency sampling was done. Total effort by

U.S. troll vessels in the South Pacific increased 85% from 2,910 days in the 1996-97 season to 5,379 days in the 1997-98 season. U.S. troll vessels landed 1,764 t of albacore during the 1997-98 South Pacific season. The 1997-98 season began in November 1997 and ended in April 1998. The most productive areas were between 35°S and 45°S, from 150°W to 160°W. The average CPUE for the 1997-98 season is 53 fish per day, compared to 78 fish per day in the 1996-97 season. Season-averaged CPUEs ranging from 101 fish per day to 192 fish per day were distributed between 155°W and 160°W from 40°S to 50°S. A total of 200 albacore were measured during the season. Fork lengths of measured fish range from 56 cm to 84 cm and averaged 67 cm. At least one prominent mode is centered at 63 cm in the length-frequency histogram of sampled fish.

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Table 1. North Pacific albacore landings (in metric tons) by fisheries, 1952-1997.[1] Provisional estimates in (). "–" indicates data not available. 0 indicates less than 1 metric ton.

YEAR	JAPAN[2]					TAIWAN		KOREA[3]	
	GILL NET	LONG LINE	POLE & LINE	PURSE SEINE	OTHER GEAR	GILL NET	LONG LINE	GILL NET	LONG LINE
1952		26,687	41,786	154	237				
1953		27,777	32,921	38	132				
1954		20,958	28,069	23	38				
1955		16,277	24,236	8	136				
1956		14,341	42,810		57				
1957		21,053	49,500	83	151				
1958		18,432	22,175	8	124				
1959		15,802	14,252		67				
1960		17,369	25,156		76				
1961		17,437	18,636	7	268				
1962		15,764	8,729	53	191				
1963		13,464	26,420	59	218				
1964		15,458	23,858	128	319		26		
1965		13,701	41,491	11	121		261		
1966		25,050	22,830	111	585		271		
1967		28,869	30,481	89	520		635		
1968		23,961	16,597	267	1,109		698		
1969		18,006	32,107	521	1,480		634		
1970		15,372	24,376	317	794		1,516		
1971		11,035	53,198	902	367		1,759		
1972	1	12,649	60,762	277	646		3,091		
1973	39	16,059	69,811	1,353	533		128		
1974	224	13,053	73,576	161	959		570		
1975	166	10,060	52,157	159	254		1,494		2,463
1976	1,070	15,896	85,336	1,109	285		1,251		859
1977	688	15,737	31,934	669	379		873		792
1978	4,029	13,061	59,877	1,115	2,097		284		228
1979	2,856	14,249	44,662	125	1,158		187	0	259
1980	2,986	14,743	46,743	329	1,209	--	318	6	597
1981	10,348	18,020	27,426	252	904	--	339	16	459
1982	12,511	16,762	29,615	561	732	--	559	113	387
1983	6,852	15,103	21,098	350	125	--	520	233	454
1984	8,988	15,111	26,015	3,380	518	--	471	516	136
1985	11,204	14,320	20,714	1,533	407	--	109	576	291
1986	7,813	12,945	16,096	1,542	650	--	--	726	241
1987	6,698	14,642	19,091	1,205	189	2,514	--	817	182
1988	9,074	13,904	6,216	1,208	177	7,389	38	1016	109
1989	7,437	13,194	8,629	2,521	466	8,350	544	1,023	81
1990	6,064	15,928	8,532	1,995	253	16,701	287	1016	20
1991	3,401	10,379	7,103	2,652	399	3,398	353	852	3
1992	2,721	19,149	13,888	4,104	1,534	7,866	300	271	43
1993	287	29,616	12,809	2,889	867	0	1,494	0	43
1994	263	29,612	26,391	2,026	799	0	1,586	0	43
1995	282	28,677	20,981	1,177	937	0	3,789	0	43
1996	(282)	(28,677)	(23,383)	(240)	(937)	(0)	(4,596)	(0)	(43)
1997	(282)	(28,677)	(23,383)	(240)	(937)	(0)	(4,596)	(0)	(43)
1998	(282)	(28,677)	(23,383)	(240)	(937)	(0)	(4,596)	(0)	(43)

[1] Data are from the 15th North Pacific Albacore Workshop, December 3-5 1997, Nanaimo, B.C., Canada except as noted.

[2] Japanese pole & line landings include fish caught by research vessels. Longline landings for 1952-1960 exclude minor amounts taken by vessels under 20 metric tons.

[3] Korean longline landings calculated from Y. Gong (pers. comm.) using the ratio of landings, in numbers, from the North Pacific. Gillnet landings for 1979-1990 are calulated by multiplying the 1991 CPUE (# fish per pok) by effort (# poks) then multiplying by average weight (1991, 1992: 4.13 kg/fish).

Table 1. Continued

YEAR	U.S.[4]							CANADA	MEXICO	GRAND TOTAL
	BAIT BOAT	GILL NET	LONG LINE	PURSE SEINE	SPORT	TROLL	OTHER GEAR	TROLL	OTHER GEAR	
1952			46		1,373	23,843		71		94,197
1953			22		171	15,740		5		76,806
1954			14		147	12,246				61,495
1955			7		577	13,264				54,505
1956			6		482	18,751		17		76,464
1957			4		304	21,165		8		92,268
1958			7		48	14,855		74		55,723
1959			5		0	20,990	5	212		51,333
1960			4		557	20,100	4	5		63,271
1961	2,837		6		1,355	12,055	6	4		52,611
1962	1,085		8		1,681	19,752	8	1		47,272
1963	2,432		7		1,161	25,140	7	5		68,913
1964	3,411		4		824	18,388	4	3		62,423
1965	417		3		731	16,542	3	15		73,296
1966	1,600		9		588	15,333	9	44		66,430
1967	4,113		12		707	17,814	12	161		83,413
1968	4,906		10		951	20,434	10	1,028		69,971
1969	2,996		12		358	18,827	12	1,365		76,318
1970	4,416		9		822	21,032	9	390		69,053
1971	2,071		11		1,175	20,526	11	1,746		92,801
1972	3,750		8		637	23,600	8	3,921	100	109,450
1973	2,236		14		84	15,653	14	1,400	0	107,324
1974	4,777		8		94	20,178	9	1,331	1	114,941
1975	3,243		29		640	18,932	43	111	1	89,752
1976	2,700		18		713	15,905	27	278	36	125,483
1977	1,497		23		537	9,969	36	53	0	63,187
1978	950		54		810	16,613	69	23	1	99,211
1979	303		(27)		74	6,781	31	521	1	71,234
1980	382		(9)		168	7,556	24	212	31	(75,313)
1981	748		(4)		195	12,637	60	200	8	(71,616)
1982	425		(40)		257	6,609	84	104	7	(68,766)
1983	607		(95)		87	9,359	213	225	33	(55,354)
1984	1,030		(113)	3,728	1,427	9,304	138	50	113	(71,038)
1985	1,498	2	(130)		1,176	6,415	83	56	49	(58,563)
1986	432	3	(148)		196	4,708	106	30	3	(45,639)
1987	158	5	150		74	2,766	136	104	7	(48,738)
1988	598	15	308		64	4,212	318	155	15	(44,816)
1989	54	4	249		160	1,860	272	140	2	44,986
1990	115	29	177	71	24	2,603	181	302	2	(54,300)
1991	0	17	312	0	6	1,845	384	139	–	(31,243)
1992	0	0	335	0	2	4,572	408	363	–	(55,556)
1993	–	0	439	–	25	6,254	331	494	–	(55,548)
1994	0	38	546	–	106	10,978	712	836	–	(73,936)
1995	0	40	873	–	102	8,200	1,096	1,415	–	(67,612)
1996	0	38	1,188	11	51	16,346	0	(544)	–	(76,336)
1997	0	38	1,648	2	744	14,151	0	(477)	–	(75,218)
1998	(6)	(58)	(1,121)	(39)	(1,153)	(14,682)	(1)	(680)	–	(75,898)

[4] U.S. troll boat landings for 1952-1960 include fish caught by bait boats. U.S. troll boat landings for 1984-1988 include gillnet landings.

Table 2. South Pacific albacore landings (in metric tons) by fisheries, 1952-1997.[1] Provisional estimates in (). "–" indicates data not available. 0 indicates less than 1 metric ton.

YEAR	JAPAN			TAIWAN		KOREA		U.S.		NEW ZEALAND		FRENCH POLYNESIA	
	GILL NET	LONG[2] LINE	POLE & LINE	GILL NET	LONG LINE	GILL NET	LONG LINE	LONG[3] LINE	TROLL[4]	LONG LINE	TROLL	LONG LINE	TROLL
1952		154											
1953		803											
1954		9,578											
1955		8,625											
1956		7,281											
1957		8,757											
1958		18,490					146						
1959		17,385					456						
1960		21,638	45				610						
1961		23,412					330						
1962		34,620					599						
1963		29,120	16		608		1,367						
1964		19,390			629		2,911						
1965		17,793			1,640		6,405						
1966		21,627			6,669		10,817						
1967		15,104			11,497		13,717				5		
1968		6,659			12,254		10,138				14		
1969		4,894			9,503		9,963				--		
1970		5,297			14,484		11,599				50	--	
1971		3,472			15,871		14,482				--	--	
1972		3,027			16,674		14,439				268	--	
1973		2,550			17,741		17,452				484	--	
1974		1,868			16,857		12,194				898	--	
1975		1,333			16,056		9,015				646	--	
1976		2,054			13,206		9,058				25	--	
1977		2,328			21,429		11,229				621	--	
1978		2,845			20,702		11,658				1,686	--	
1979		2,274			14,987		11,411				814	--	
1980		2,216	19		17,998		10,449				1,468	--	
1981		4,203	8		14,390		13,342				2,085	--	
1982		4,899	1		12,634		10,769				2,434	--	
1983	32	5,723	2		12,069		7,069	5			744	--	
1984	1,581	3,804			11,155		5,321	9			2,773	--	
1985	1,928	3,868			9,601		13,544	11			3,253	--	
1986	1,936	4,426			11,913		15,877	0	92		1,911	--	
1987	919	4,490			15,009		6,821	0	751		1,227	--	
1988	4,271	7,469		1,000	17,120		6,563	1	3,558		330	--	
1989	13,263	5,828		8,520	10,867	172	5,151	0	3,280	19	5,161	--	102
1990	5,667	6,573		1,859	11,619		3,947	0	3,922	249	2,143	20	299
1991		4,468		1,394	16,508		1,866	1	5,540	325	2,236	100	326
1992		3,814	49		20,956		2,271	0	3,055	706	3,708	195	72
1993		8,381	5		17,701		1,083	0	1,036	221	3,282	714	45
1994		7,151	2		19,731			35	530	474	5,094	913	--
1995		6,326			12,775		8	52	2,092	427	5,760	772	184
1996		3,879			11,909		215	99	2,186	480	5,157	1,462	69
1997		4,625	--		15,662		845	271	1,403	323	3,303	(2,587)	(24)
1998		(4,625)	--		(15,101)		(2,680)	(326)	(1,764)	(323)	(3,303)	(2,587)	(24)

[1] Data are from Twelfth Meeting of the Standing Committee on Tuna and Billfish, 16 June - 23 June 1999 except All landings are from areas within the SPAR statistical area except as noted.

[2] Japan long line include catches from Australia-Japan joint venture vessels.

[3] 1982 - 1993 United States long line landings from Pelagic Fisheries of the Western Pacific Region 1996 Annual (Total landings for all gears).

[4] United States troll landings may include catches from December of the previous year.

Table 2. Continued.

YEAR	AUSTRALIA		NEW CALEDONIA	TONGA	FIJI	WESTERN SAMOA	SOLOMON ISLANDS	CHILE[6]	VANUATU	OTHER[7]		GRAND TOTAL
	LONG LINE	TROLL[5]	LONG LINE	LONG LINE	LONG LINE	LONG LINE	LONG LINE	DRIFT NET	LONG LINE	LONG LINE	TROLL[8]	
1952												154
1953												803
1954												9,578
1955												8,625
1956												7,281
1957												8,757
1958												18,636
1959												17,841
1960												22,293
1961												23,742
1962												35,219
1963												31,111
1964												22,930
1965												25,838
1966												39,113
1967												40,323
1968												29,065
1969												24,360
1970		100										31,530
1971		100										33,925
1972		100										34,508
1973		100					4					38,331
1974		100										31,917
1975		100										27,150
1976		100					6					24,449
1977		100					9					35,716
1978		100					9					37,000
1979		100					21					29,607
1980		100					25					32,275
1981		5					2					34,035
1982		6		106			8					30,857
1983		7	12	143			19					25,825
1984		8	112	135			19					24,917
1985	0	9	131	174			12					32,531
1986	0	10	179	206								36,550
1987	129	11	563	252								30,172
1988	107	12	584	242						0	90	41,347
1989	93	13	566	195	3					0	162	53,395
1990	51	15	1,053	152	68					4		37,641
1991	213	20	909	171	208					0	4	34,289
1992	192	70	692	199	243					0	54	36,275
1993	226	55	755	231	463	228				1		34,427
1994	351	70	840	343	586	641				29	128	36,918
1995	401	25	332	379	665	1,883	161	15	112	43	121	32,533
1996	408	(25)	414	494	1,024	2,470	1,154	(21)	287	49	215	(32,017)
1997	302	(25)	267	(494)	1,197	4,387	608	(0)	17	101	356	(36,797)
1998	(480)	(35)	(860)	(494)	(1,207)	(6,508)	(370)	(0)	(17)	(36)	(294)	(41,035)

[5] Australia troll 1970 - 1980 are incidental catches from pole-and-line vessels targeting southern bluefin tuna. 1981- include recreational catches.

[6] Chile gill net landings from R. Serra (pers. comm.).

[7] Other includes Cook Islands, Papua New Guinea, and China. China longline landings from SPC Tuna Fishery

[8] Other includes Canada, Fiji, Cook Islands, Belize, Sweden, Tonga, and Ecuador.

Table 3. Fishery statistics for the U.S. North Pacific albacore troll fishery.

FISHING SEASON	NO. TRIPS		METRIC TONS LANDED		NO. FISH LANDED		AVG FL (cm)	AVG WT (lb)	EFFORT		CPUE (fish/day)	SAMPLING COVERAGE	
	TOTAL	SAMPLED	TOTAL	SAMPLED	TOTAL	MEASURED			NO. DAYS	NO. VESSELS		LOG[1]	L-F
1994	2,000	413	10,978	4,698	1,496,971	18,433	71	16.2	24,035	725	62	43%	1.2%
1995	950	366	8,200	5,028	1,217,889	24,350	69	14.8	25,945	484	47	61%	2.0%
1996	1,750	427	16,346	7,000	2,831,741	49,378	66	12.7	30,935	733	92	43%	1.7%
1997	3,600	514	14,151	5,403	2,035,001	40,883	70	15.3	44,356	1,182	46	38%	2.0%
1998	2,550	285	14,682	5,321	2,277,834	16,505	68	14.2	20,207	892	113	36%	0.7%

Table 4. Fishery statistics for the U.S. South Pacific albacore troll fishery.

FISHING SEASON	NO. TRIPS		METRIC TONS LANDED		NO. FISH LANDED		AVG FL (cm)	AVG WT (lb)	EFFORT		CPUE (fish/day)	SAMPLING COVERAGE	
	TOTAL	SAMPLED	TOTAL	SAMPLED	TOTAL	MEASURED			NO. DAYS	NO. VESSELS		LOG1	L-F
1993-94	12	7	530	251	89,980	996	66	13.0	1,047	12	86	47%	1.1%
1994-95	42	22	2,092	1,153	297,631	1,460	70	15.5	1,989	21	150	55%	0.5%
1995-96	48	30	2,186	1,049	324,671	2,226	69	14.8	4,497	53	72	48%	0.7%
1996-97	25	21	1,403	961	227,559	1,558	67	13.6	2,912	27	78	68%	0.7%
1997-98	39	34	1,764	1,198	299,260	200	66	13.0	5,604	36	53	68%	0.1%

[1] Includes some non-U.S. vessels (Tonga, Canada, and Cook Islands) and vessels of unknown registry for logbook sampling coverage rate.

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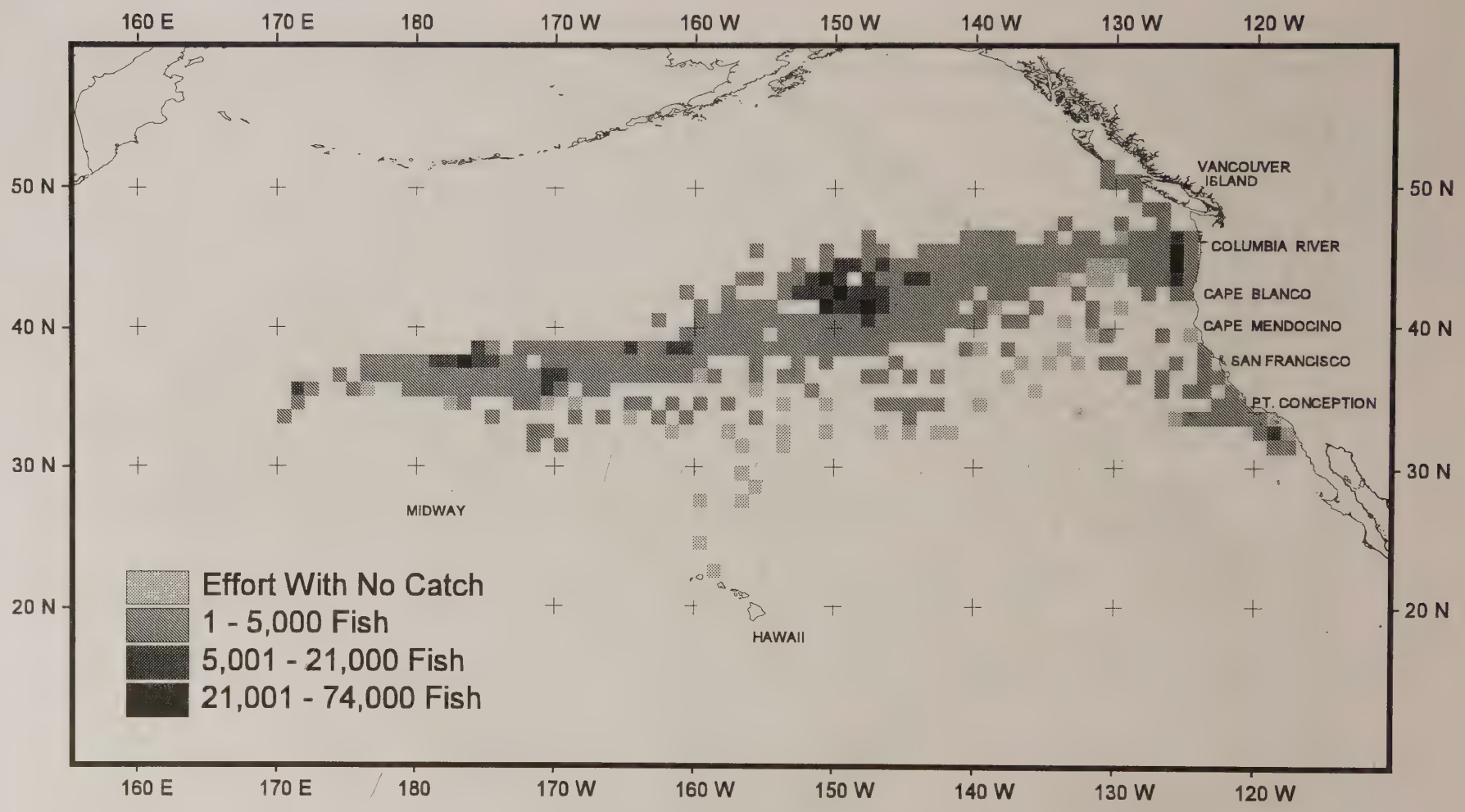

Figure 1. Distribution of albacore catches by U.S. troll vessels in the1998 North Pacific season.

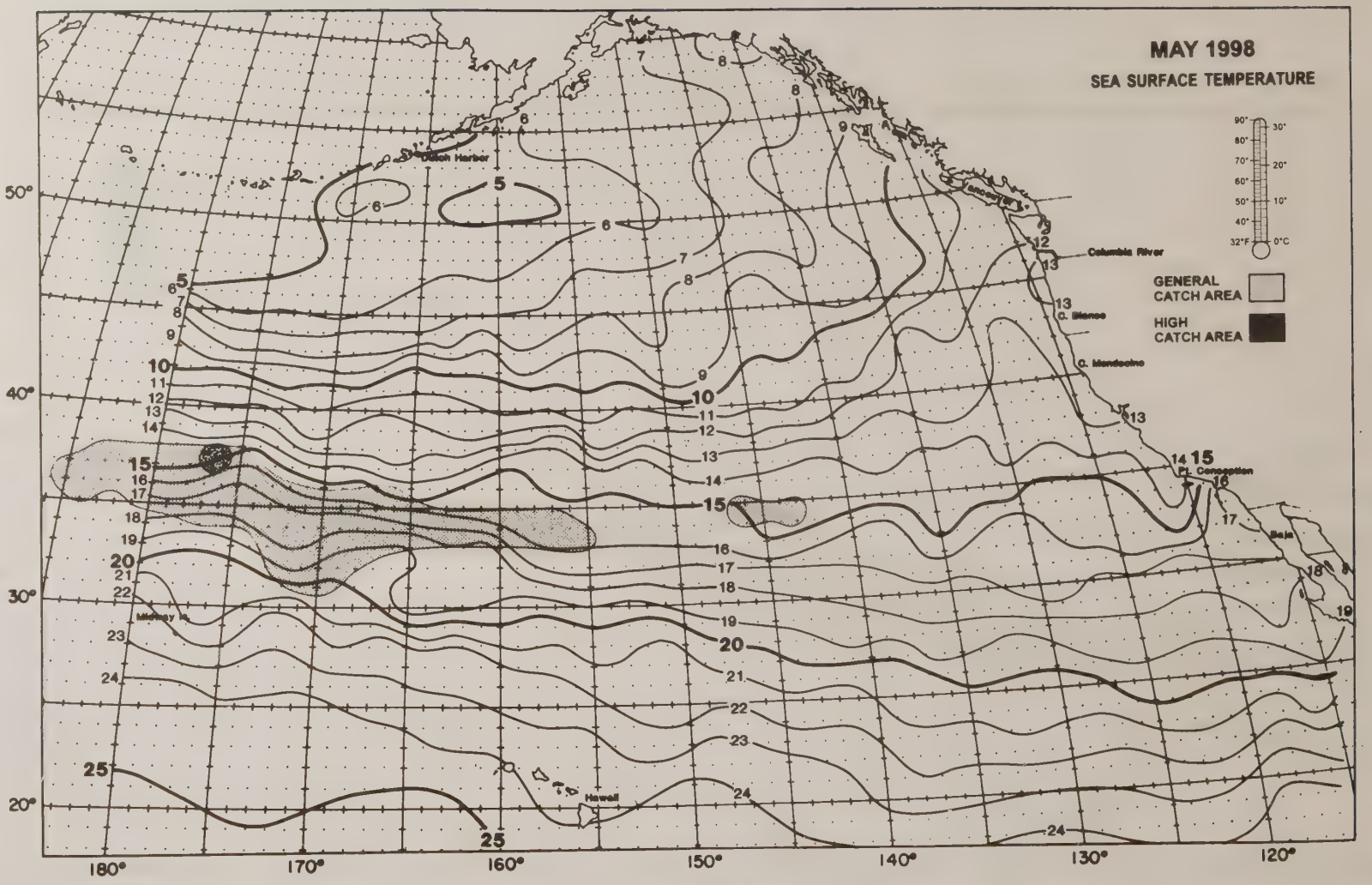

Figure 2a. Distribution of albacore catches and Sea Surface Temperatures in May 1998.

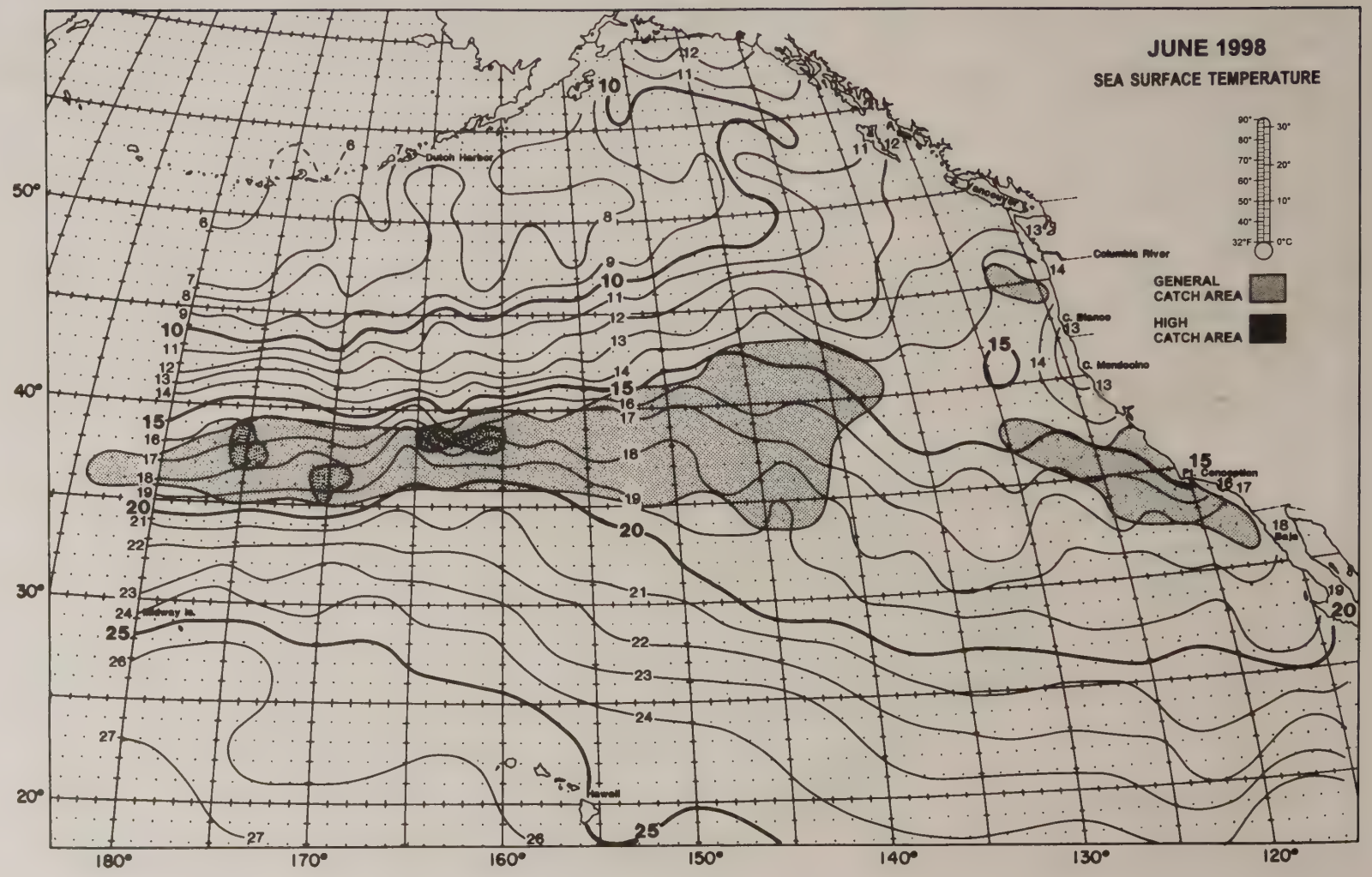

Figure 2b. Distribution of albacore catches and Sea Surface Temperatures in June 1998.

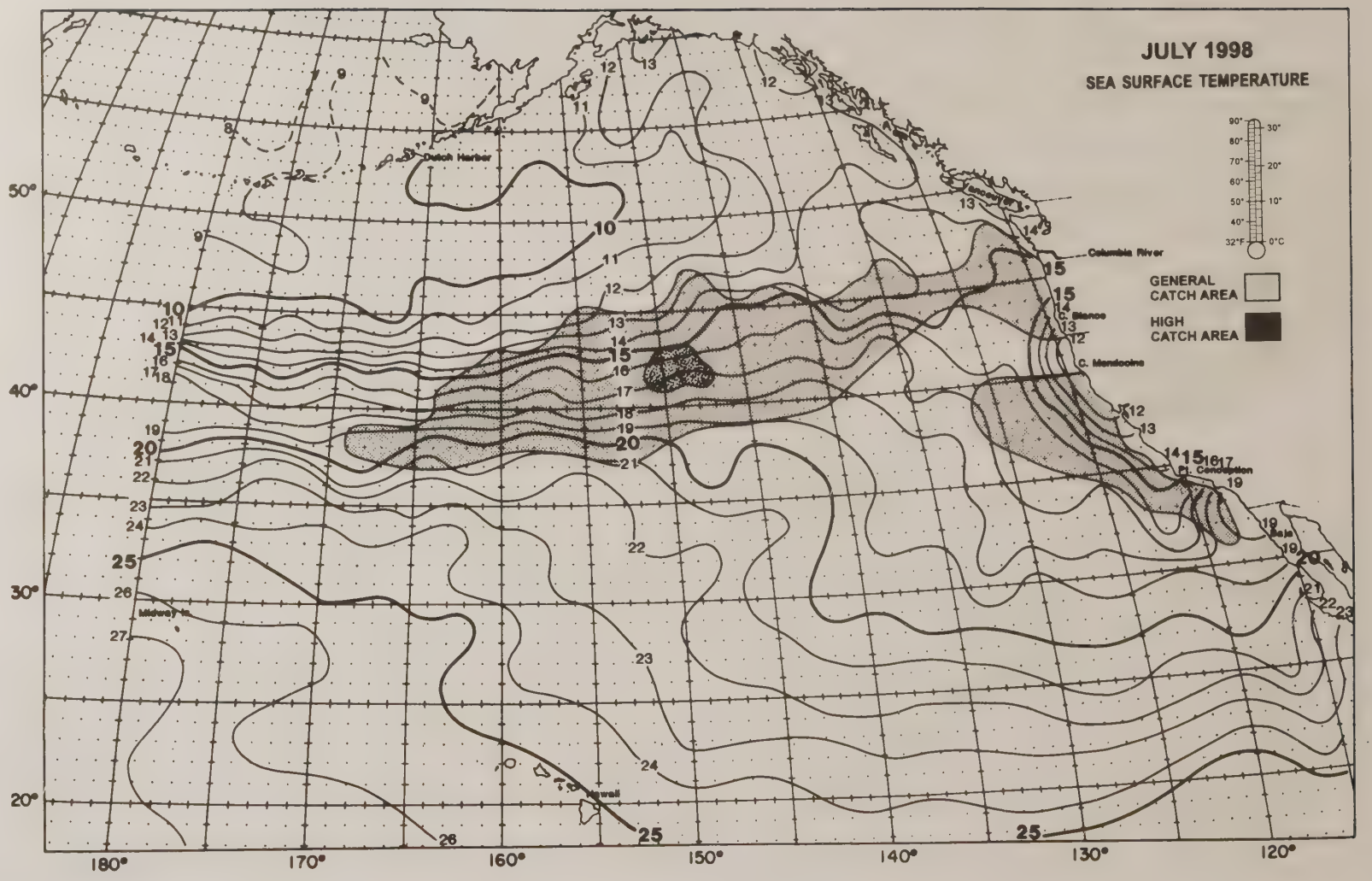

Figure 2c. Distribution of albacore catches and Sea Surface Temperatures in July 1998.

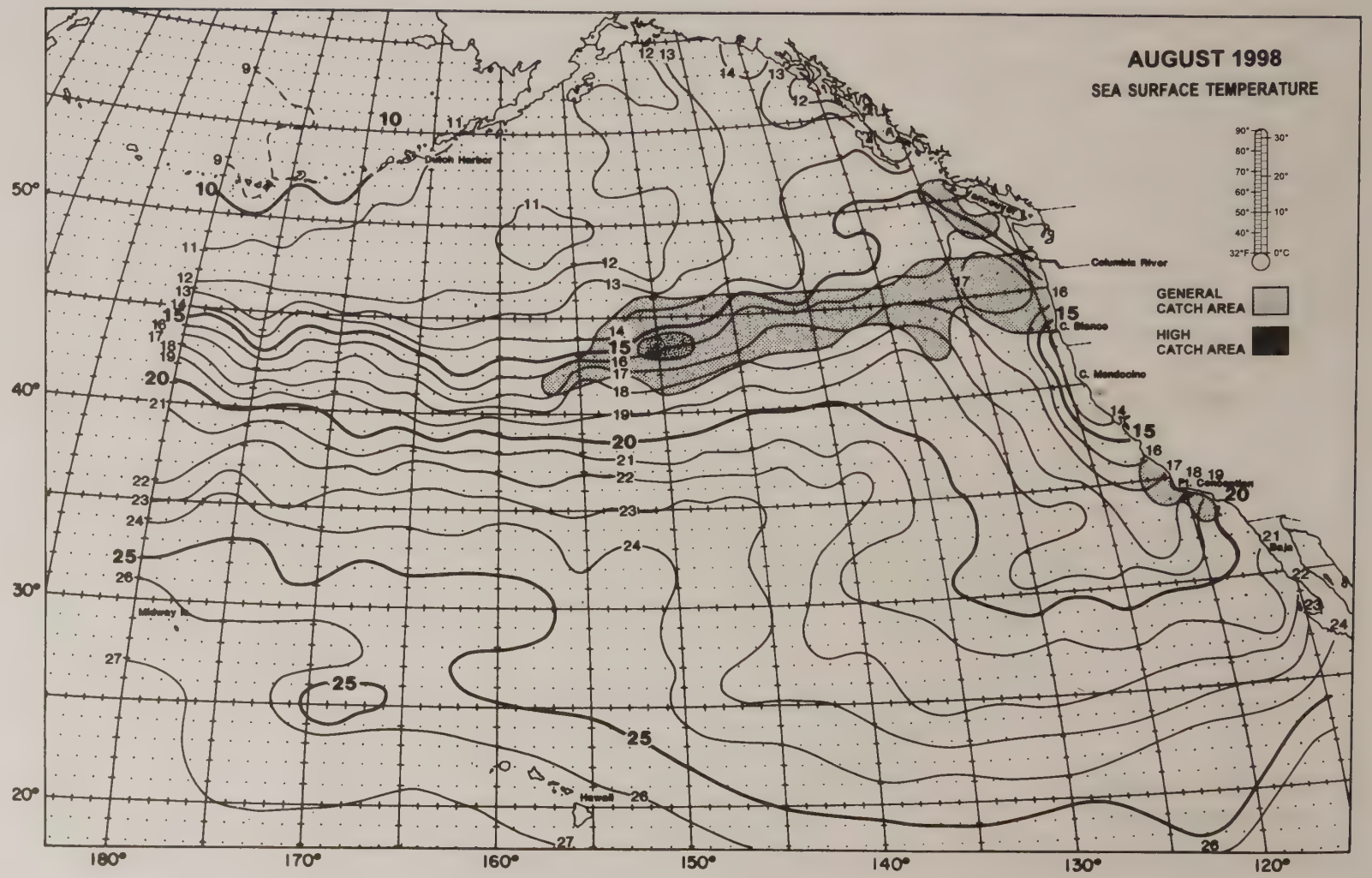

Figure 2d. Distribution of albacore catches and Sea Surface Temperatures in August 1998.

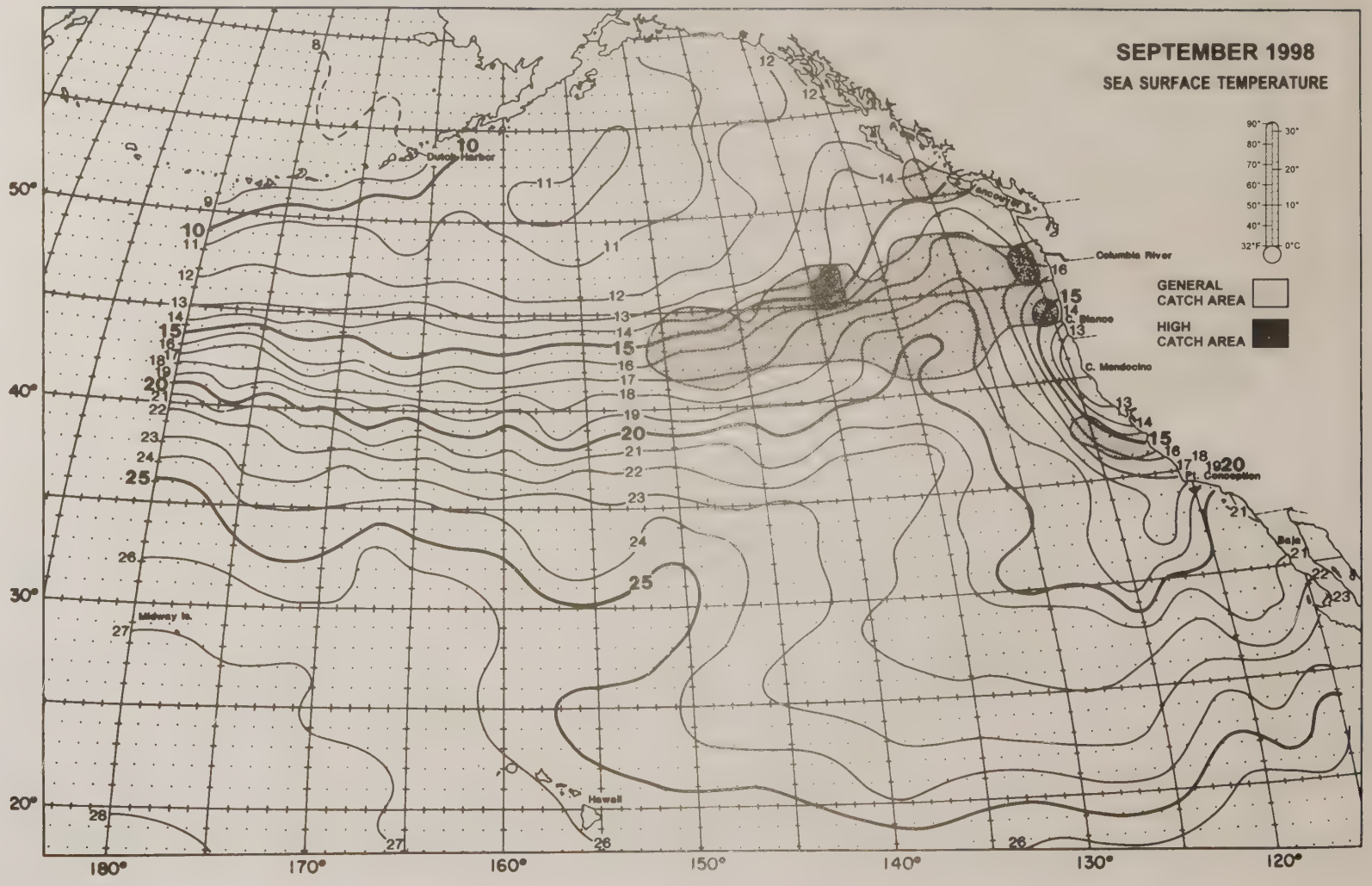

Figure 2e. Distribution of albacore catches and Sea Surface Temperatures in September 1998.

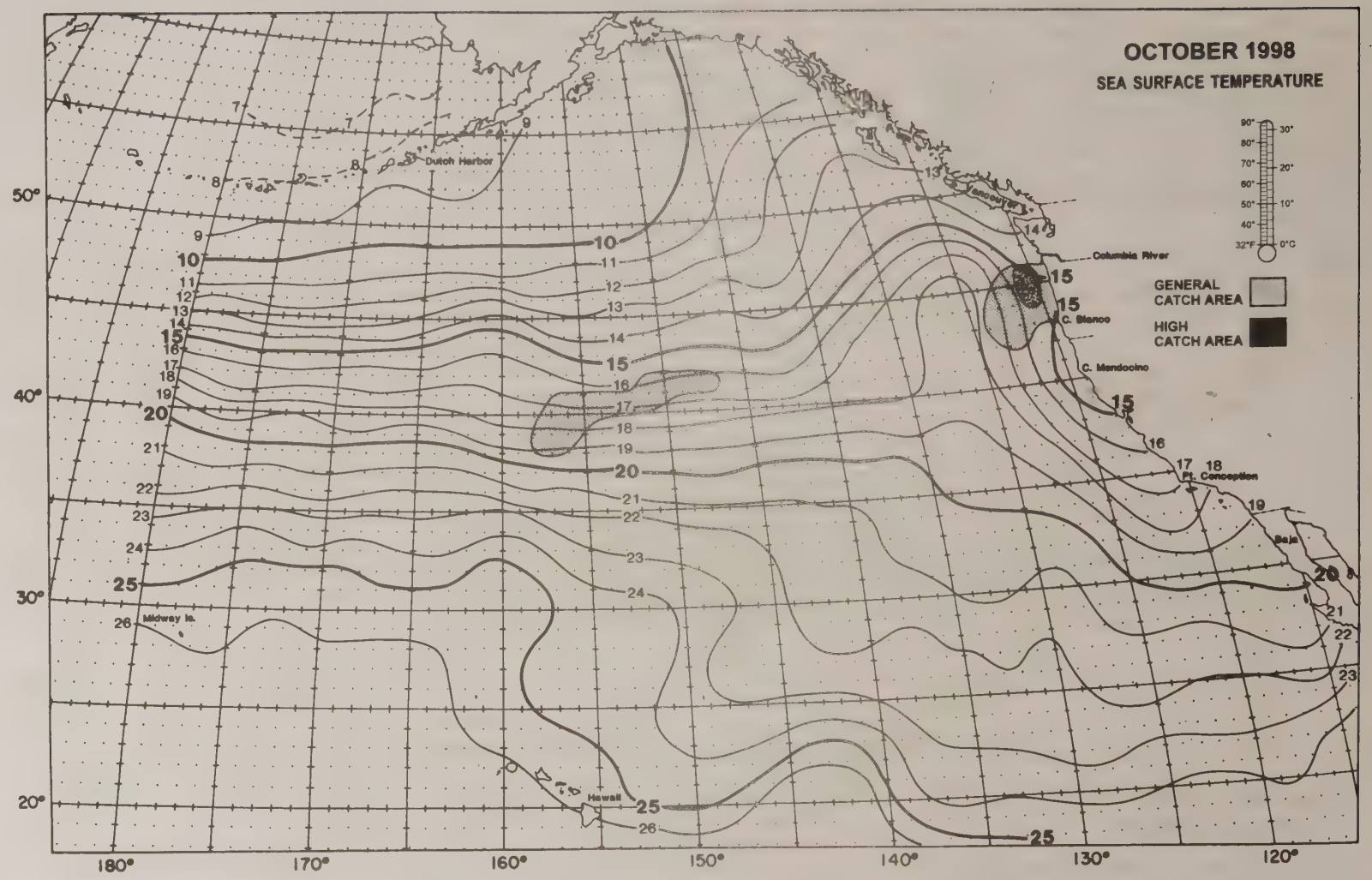

Figure 2f. Distribution of albacore catches and Sea Surface Temperatures in October 1998.

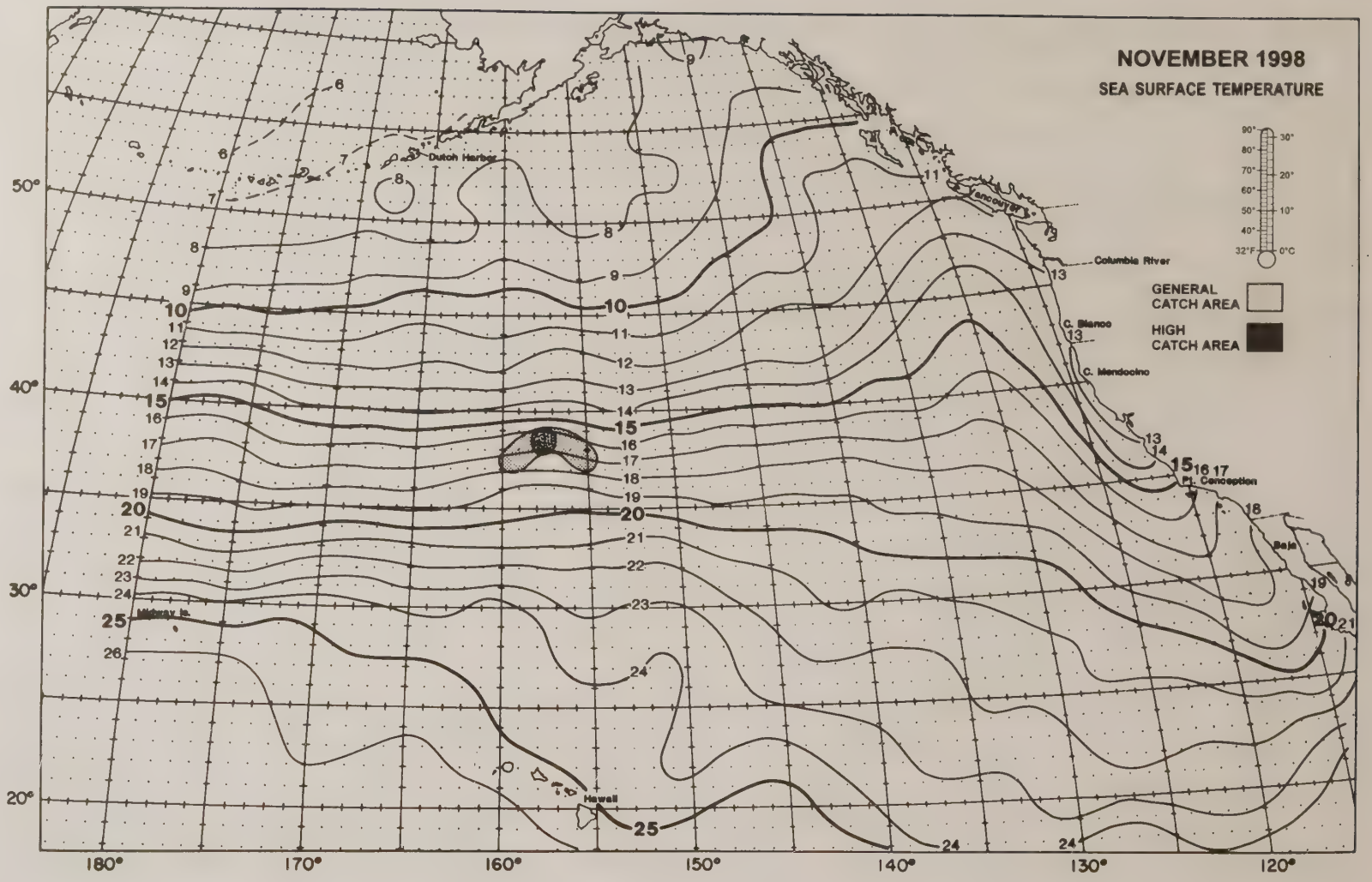

Figure 2g. Distribution of albacore catches and Sea Surface Temperatures in November 1998.

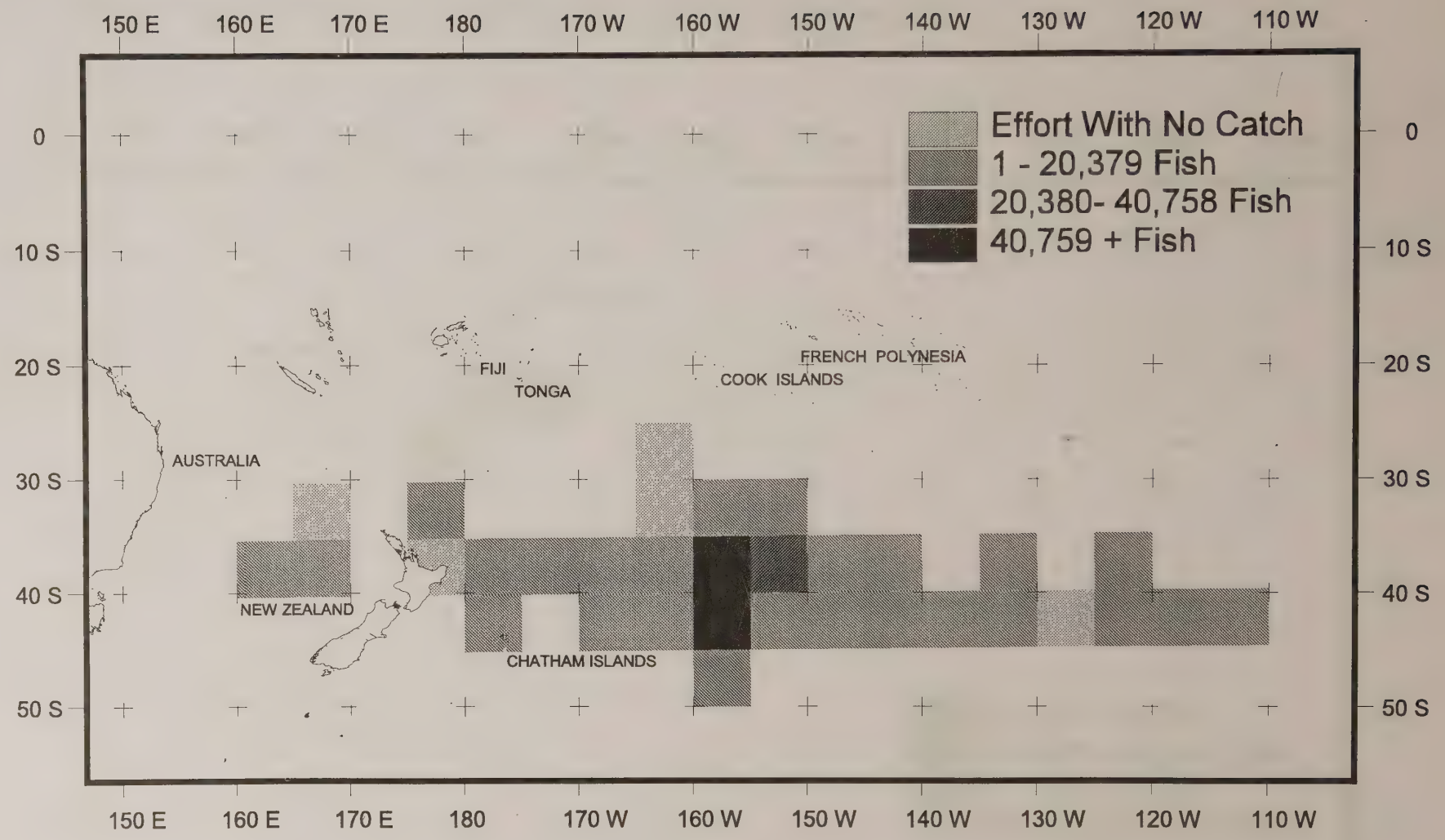

Figure 3a. Distribution of albacore catches by U.S. troll vessels in the 1997-98 South Pacific season.

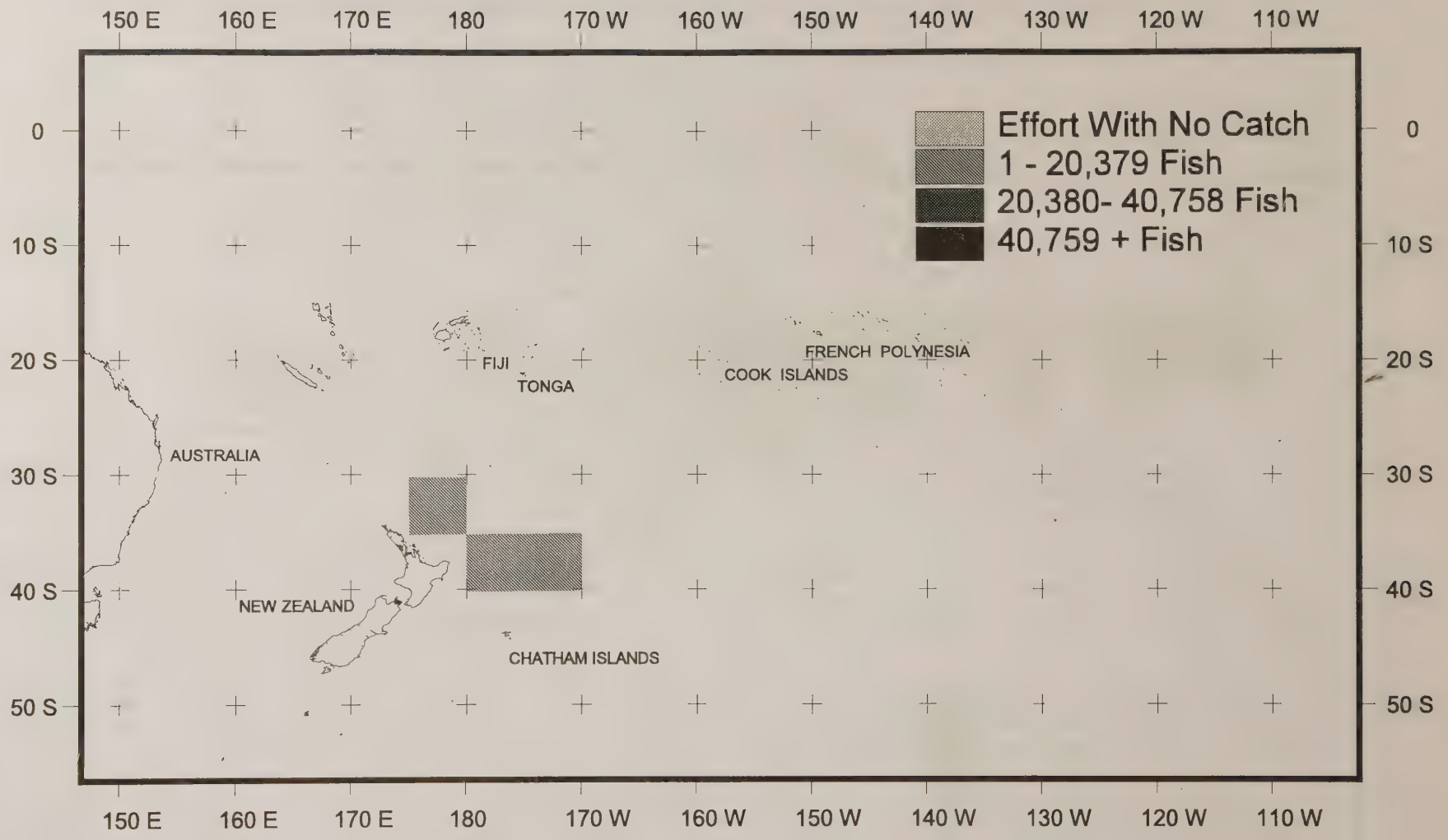

Figure 3b. Distribution of albacore catches by U.S. troll vessels in November 1997.

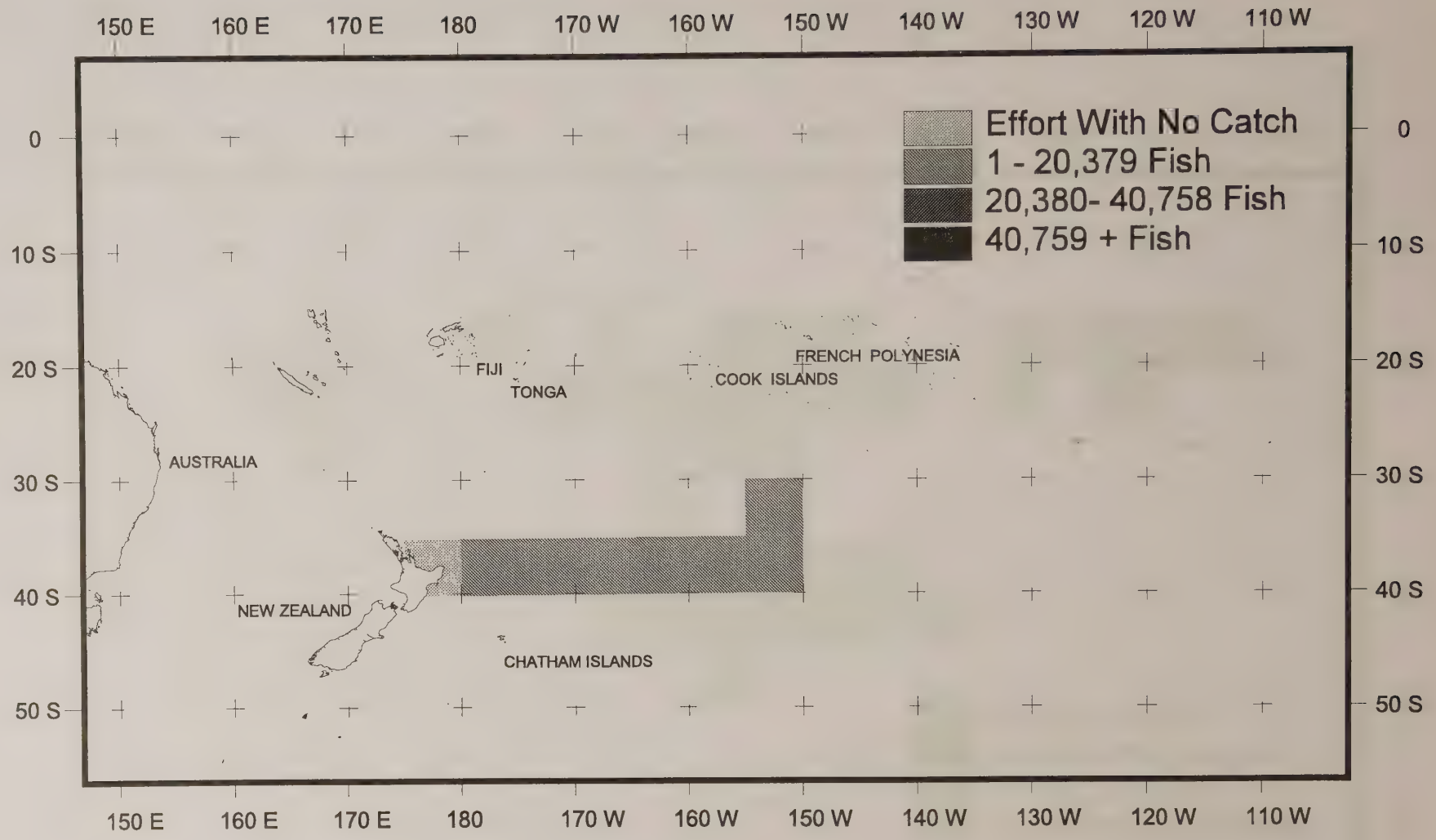

Figure 3c. Distribution of albacore catches by U.S. troll vessels in December 1997.

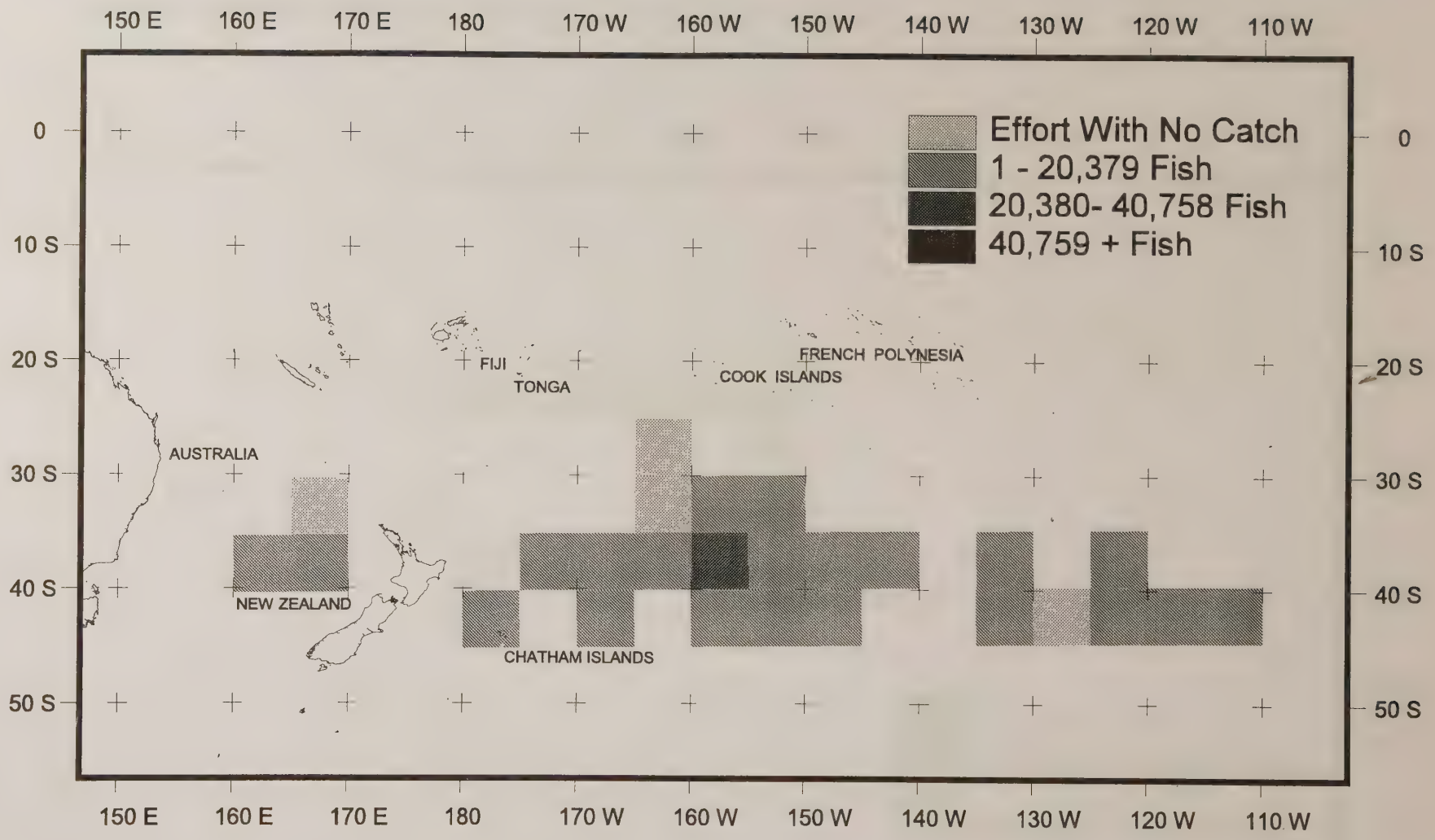

Figure 3d. Distribution of albacore catches by U.S. troll vessels in January 1998.

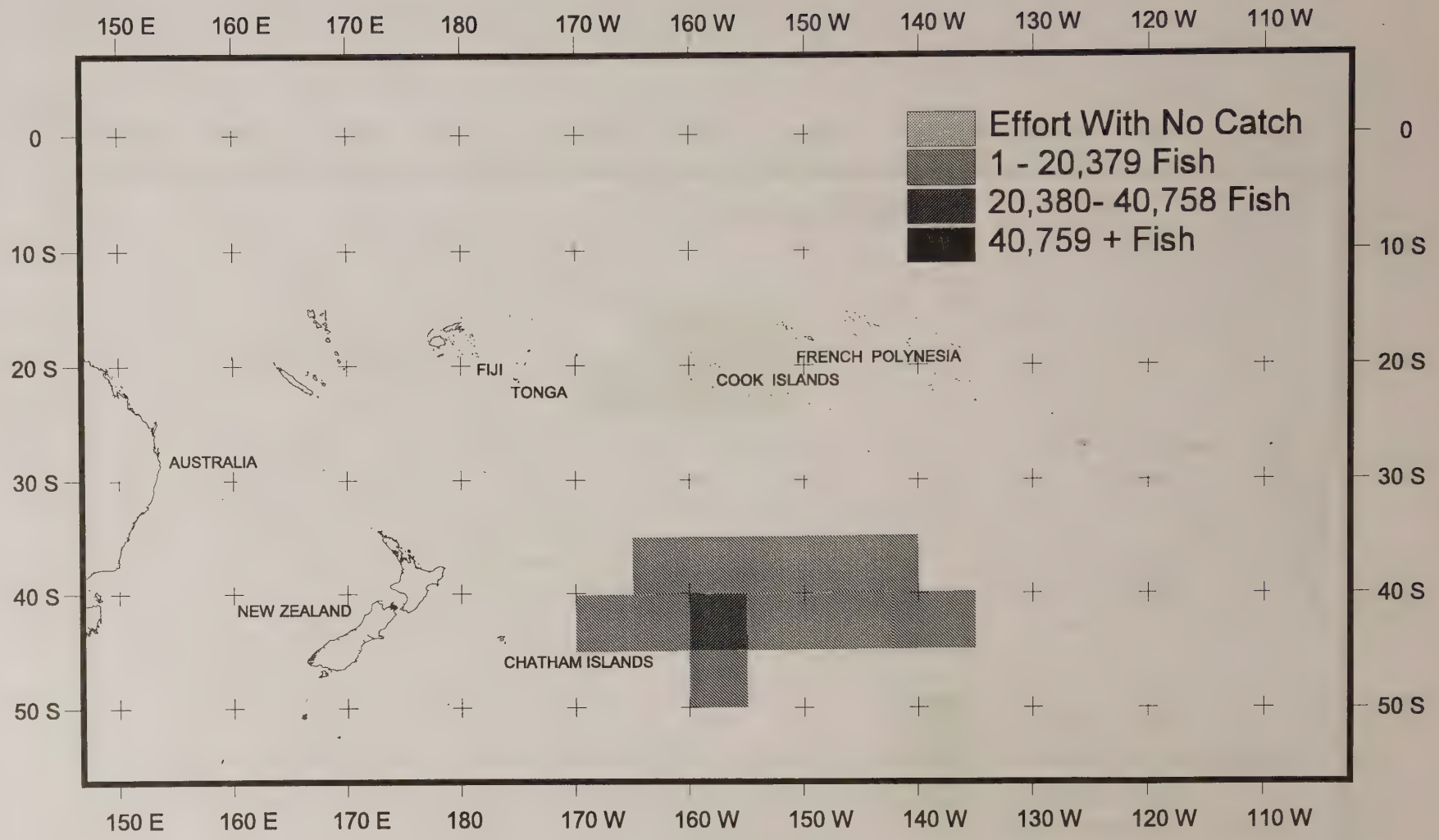

Figure 3e. Distribution of albacore catches by U.S. troll vessels in February 1998.

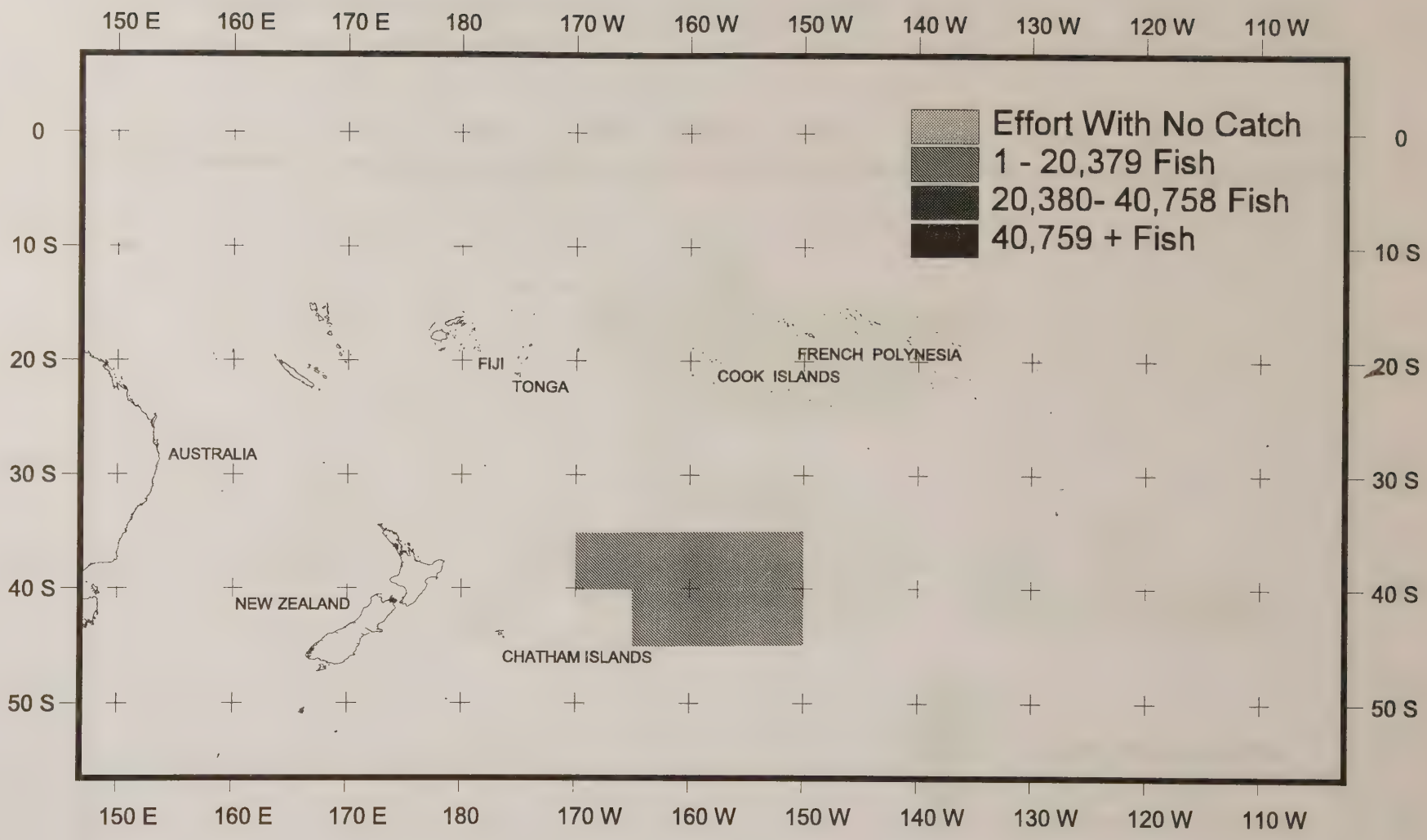

Figure 3f. Distribution of albacore catches by U.S. troll vessels in March 1998.

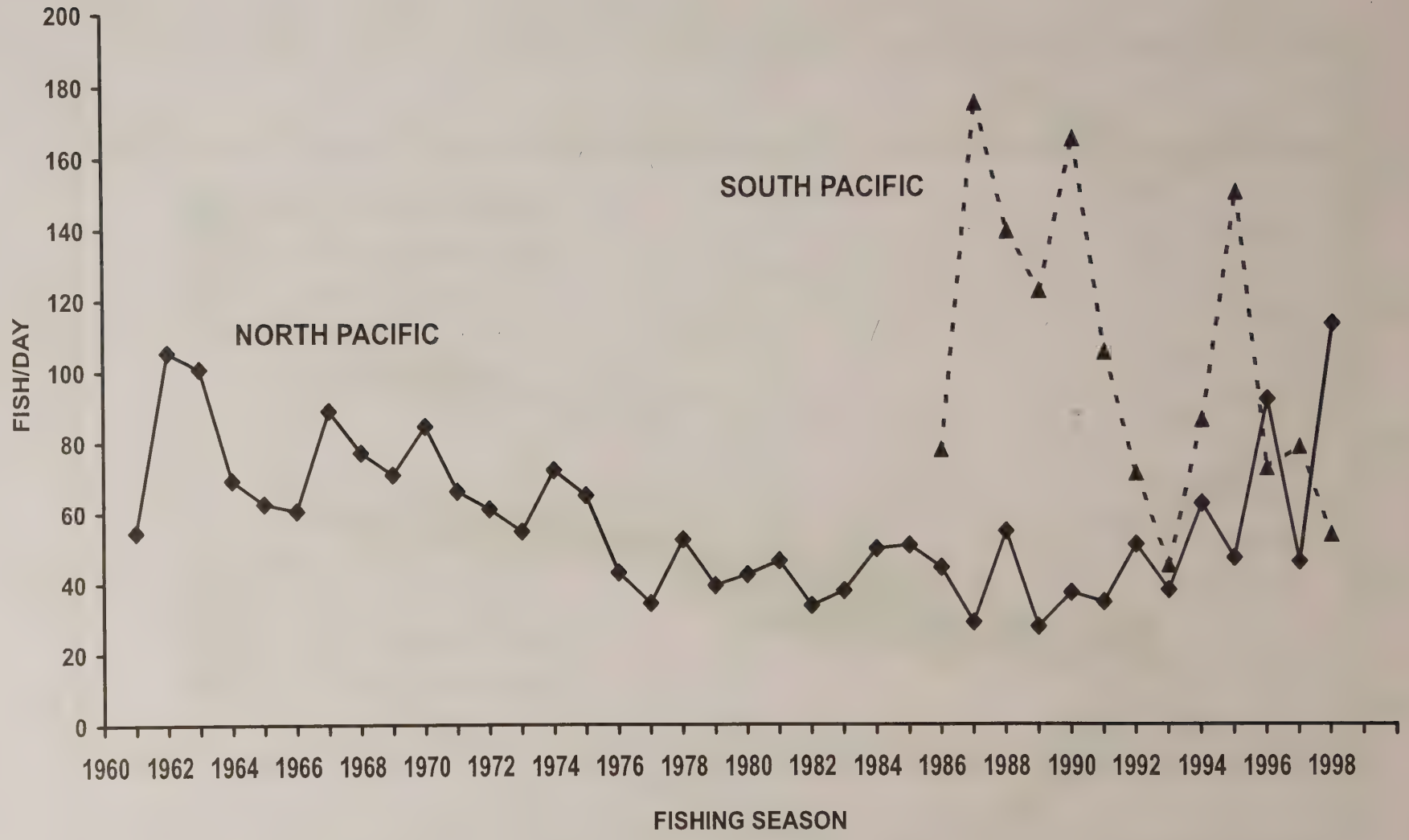

Figure 4. North and South Pacific Albacore CPUE by U.S. troll vessels from 1961 through 1998.

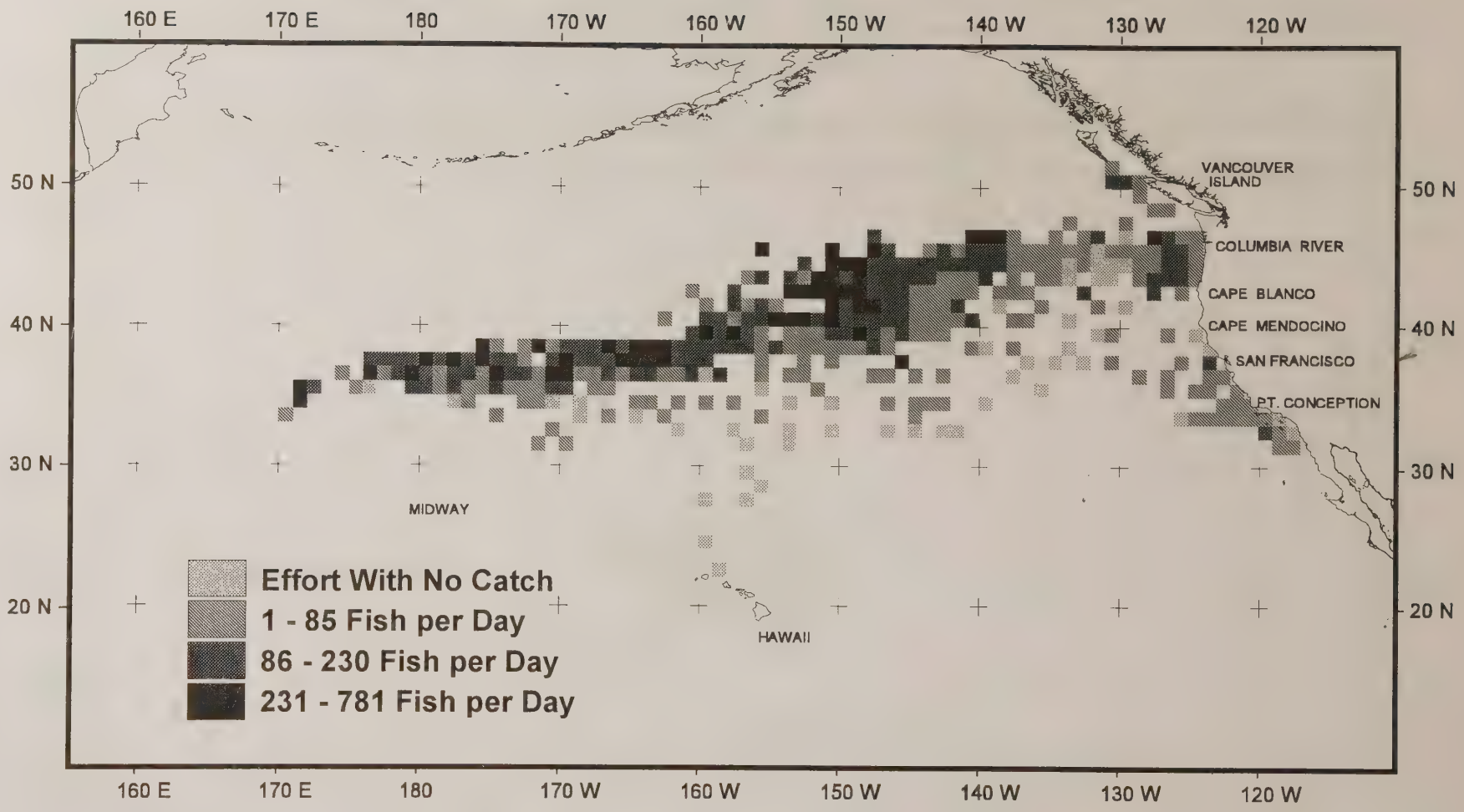

Figure 5a. Distribution of CPUE by U.S. troll vessels in the 1998 North Pacific season.

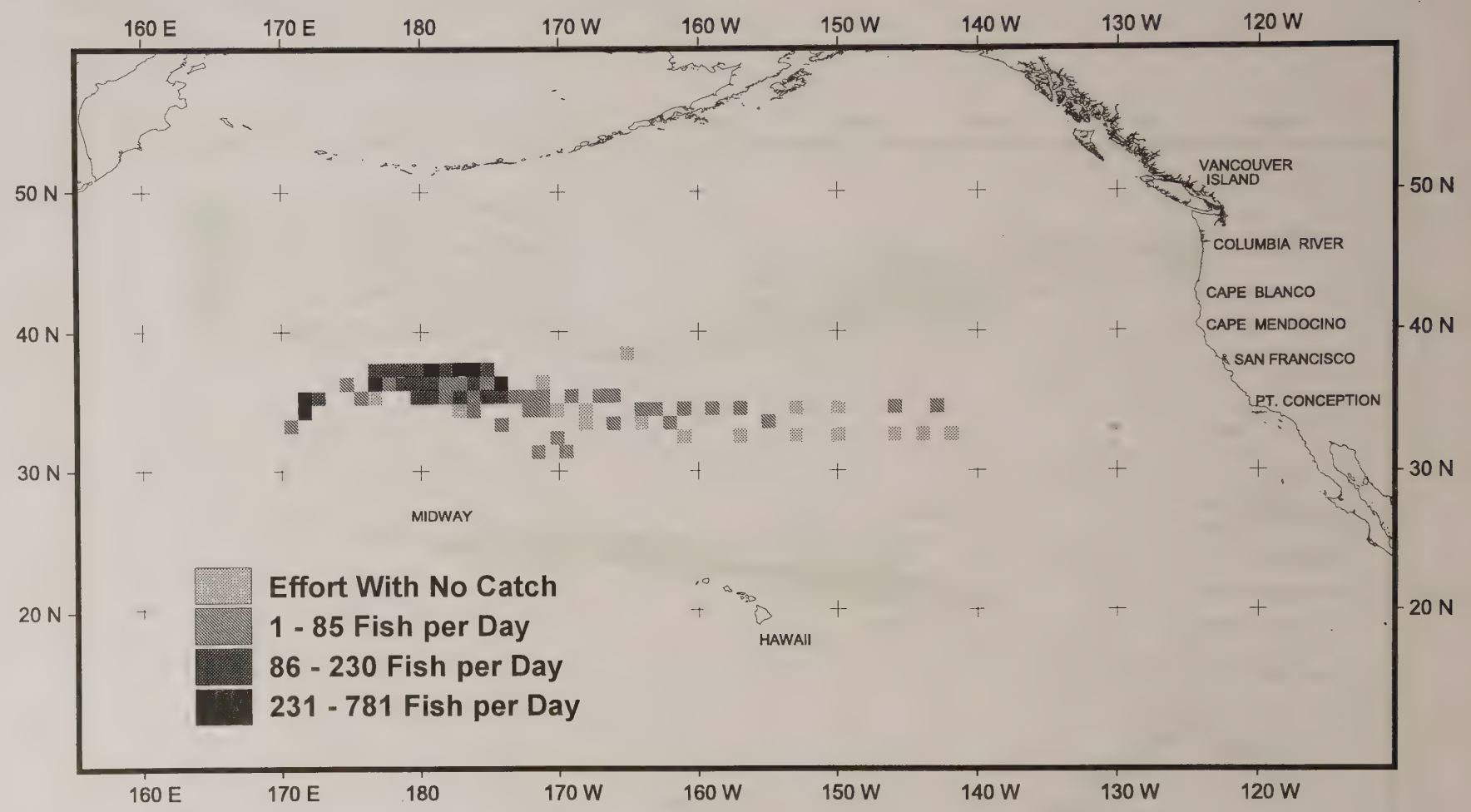

Figure 5b. Distribution of CPUE by U.S. troll vessels in May 1998.

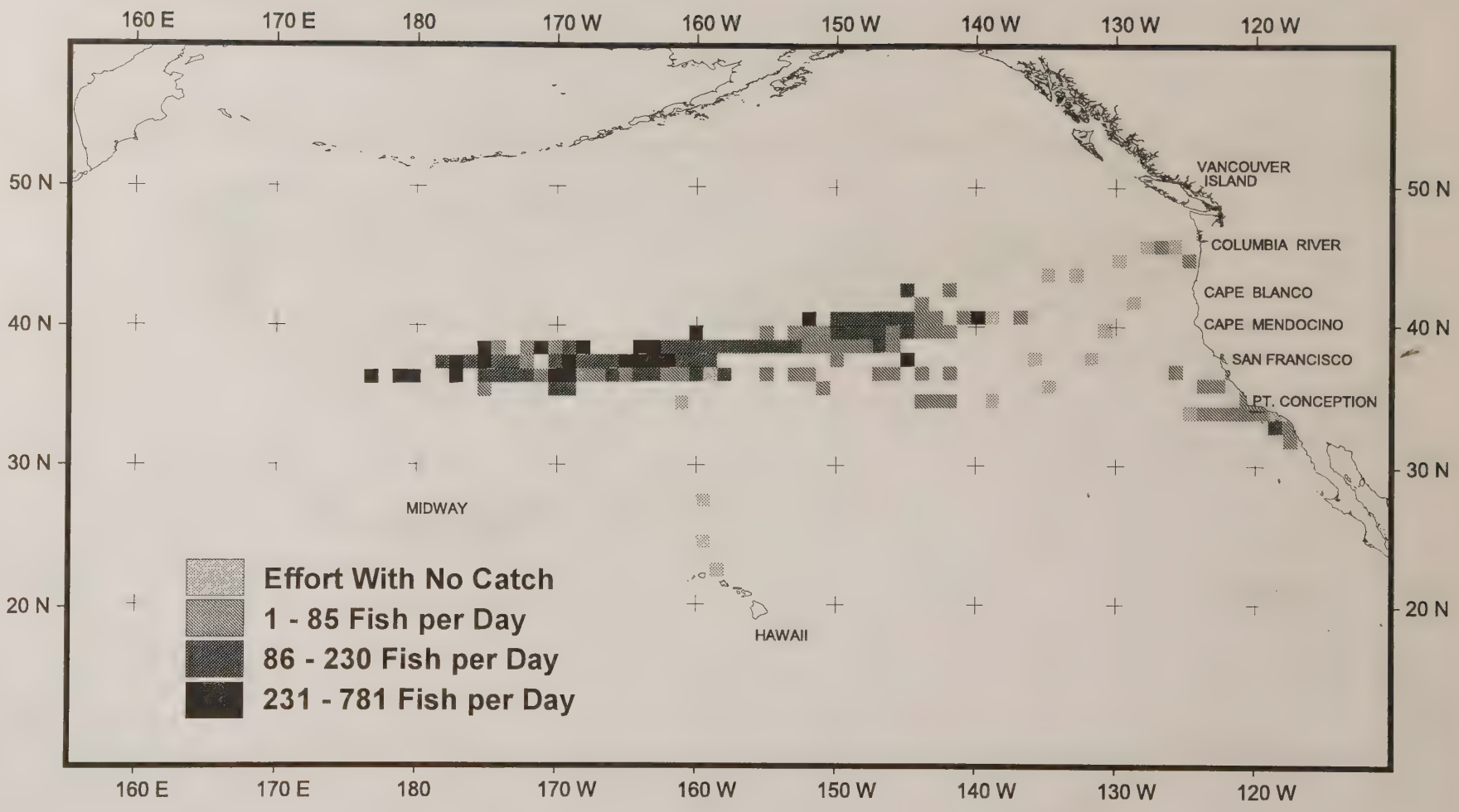

Figure 5c. Distribution of CPUE by U.S. troll vessels in June 1998.

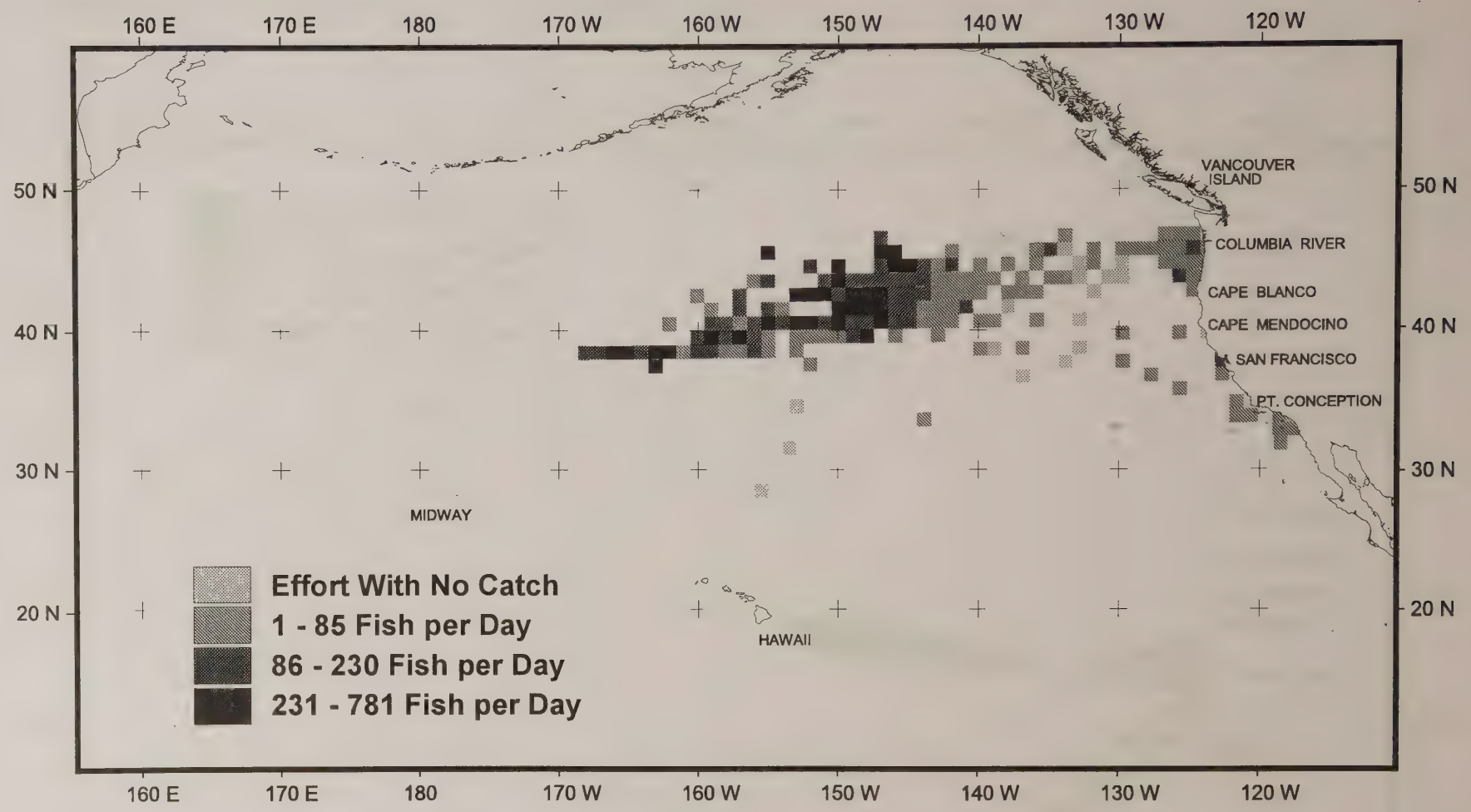

Figure 5d. Distribution of CPUE by U.S. troll vessels in July 1998.

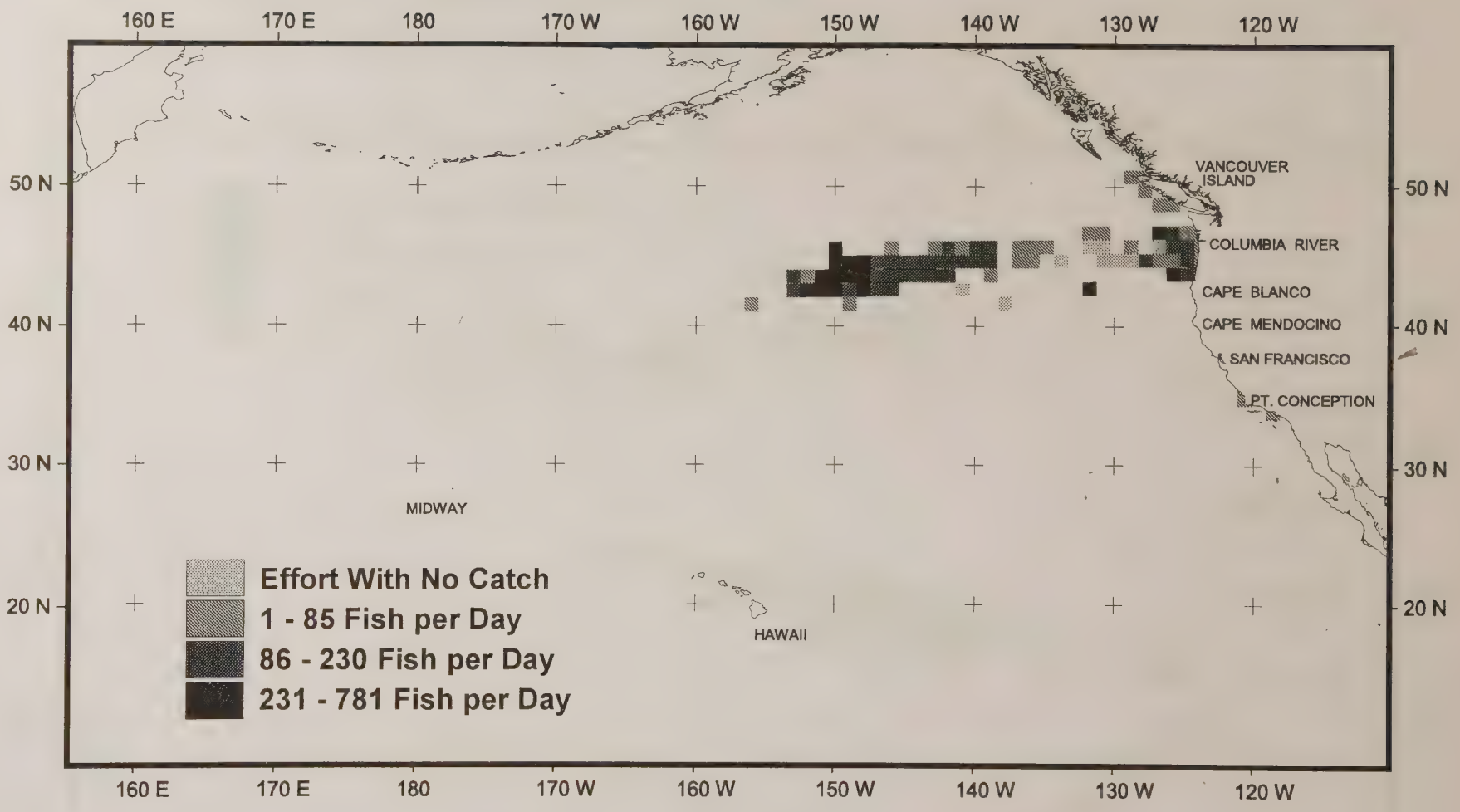

Figure 5e. Distribution of CPUE by U.S. troll vessels in August 1998.

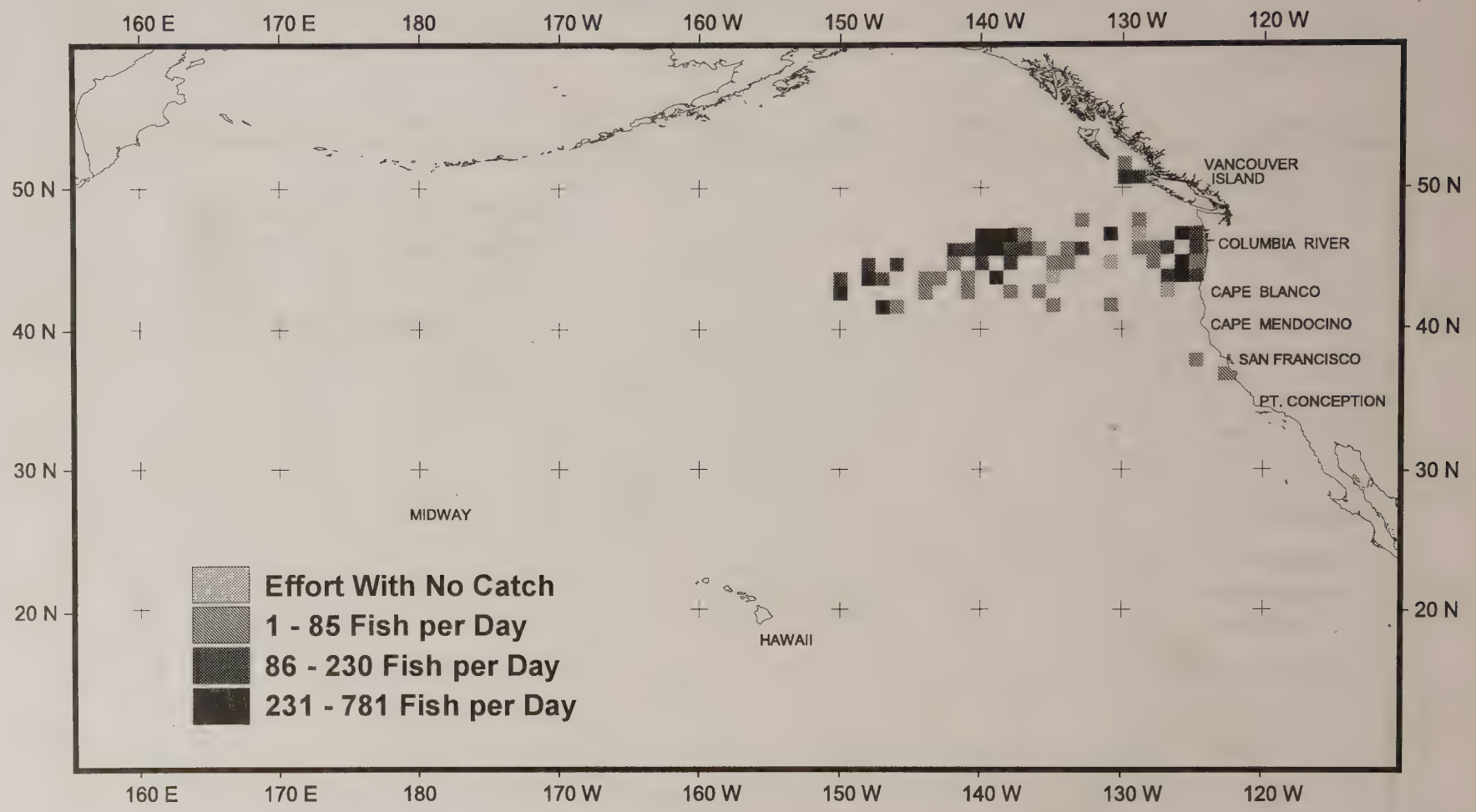

Figure 5f. Distribution of CPUE by U.S. troll vessels in September 1998.

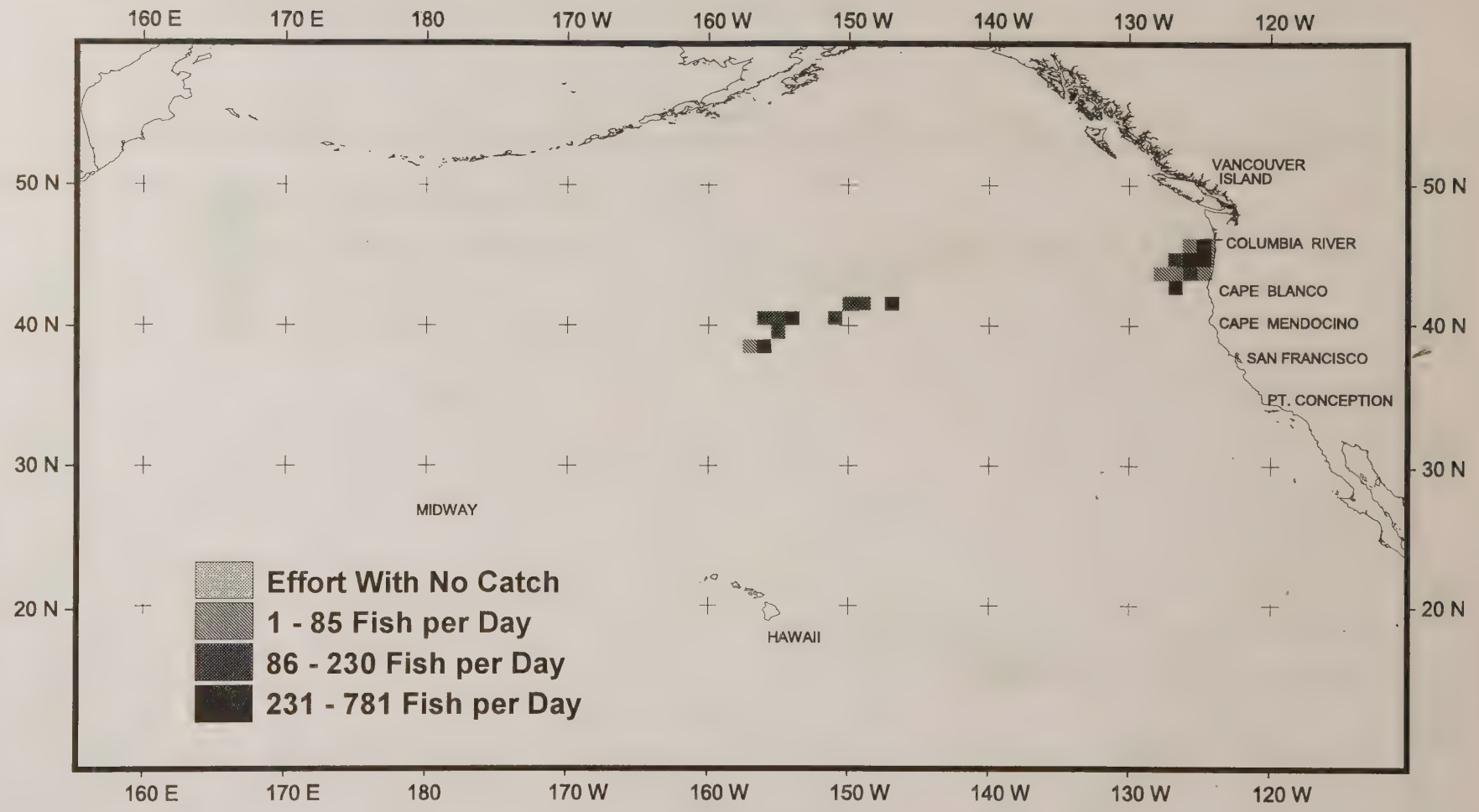

Figure 5g. Distribution of CPUE by U.S. troll vessels in October 1998.

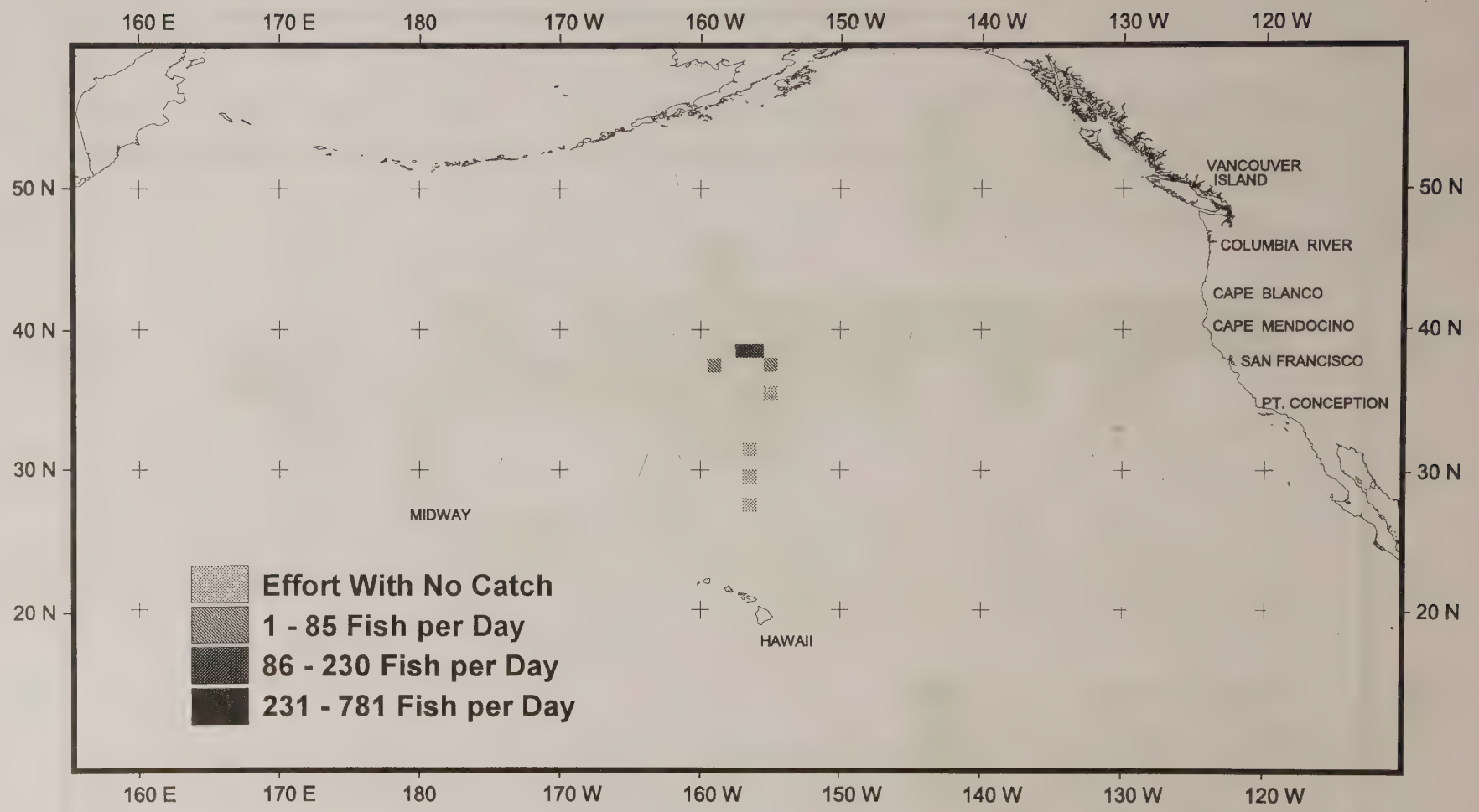

Figure 5h. Distribution of CPUE by U.S. troll vessels in November 1998.

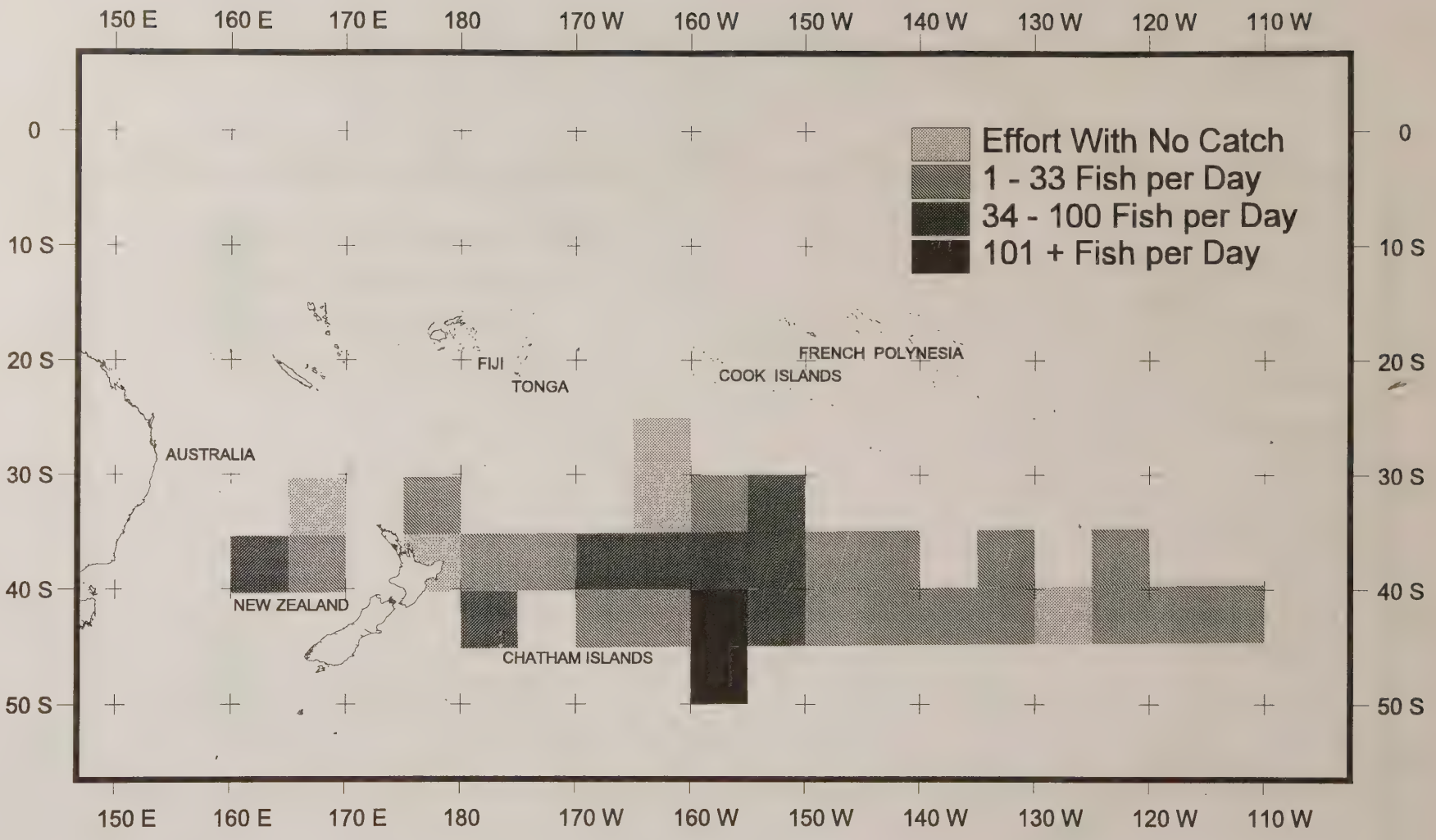

Figure 6a. Distribution of CPUE by U.S. troll vessels in the 1997-98 South Pacific season.

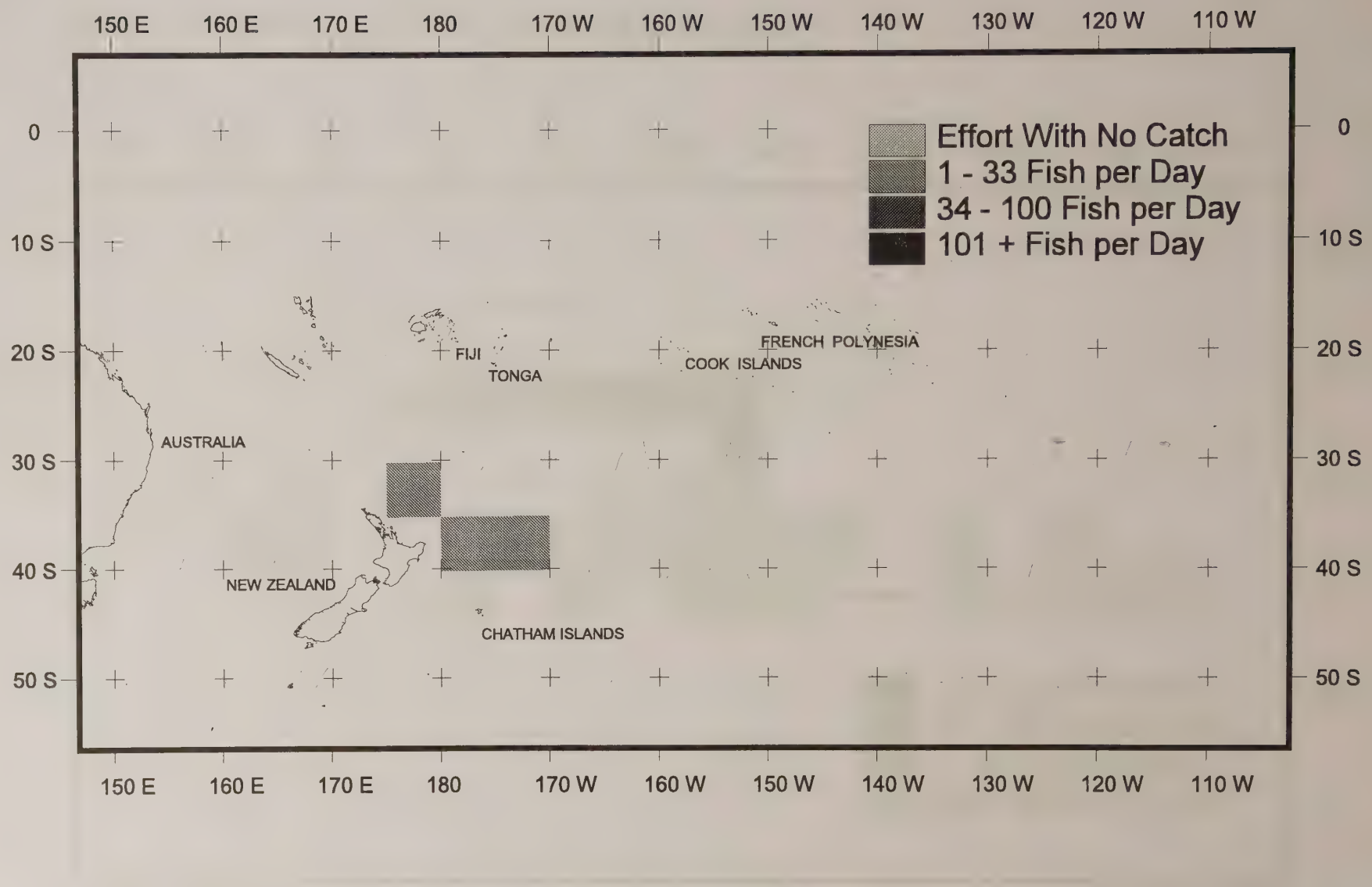

Figure 6b. Distribution of CPUE by U.S. troll vessels in November 1997.

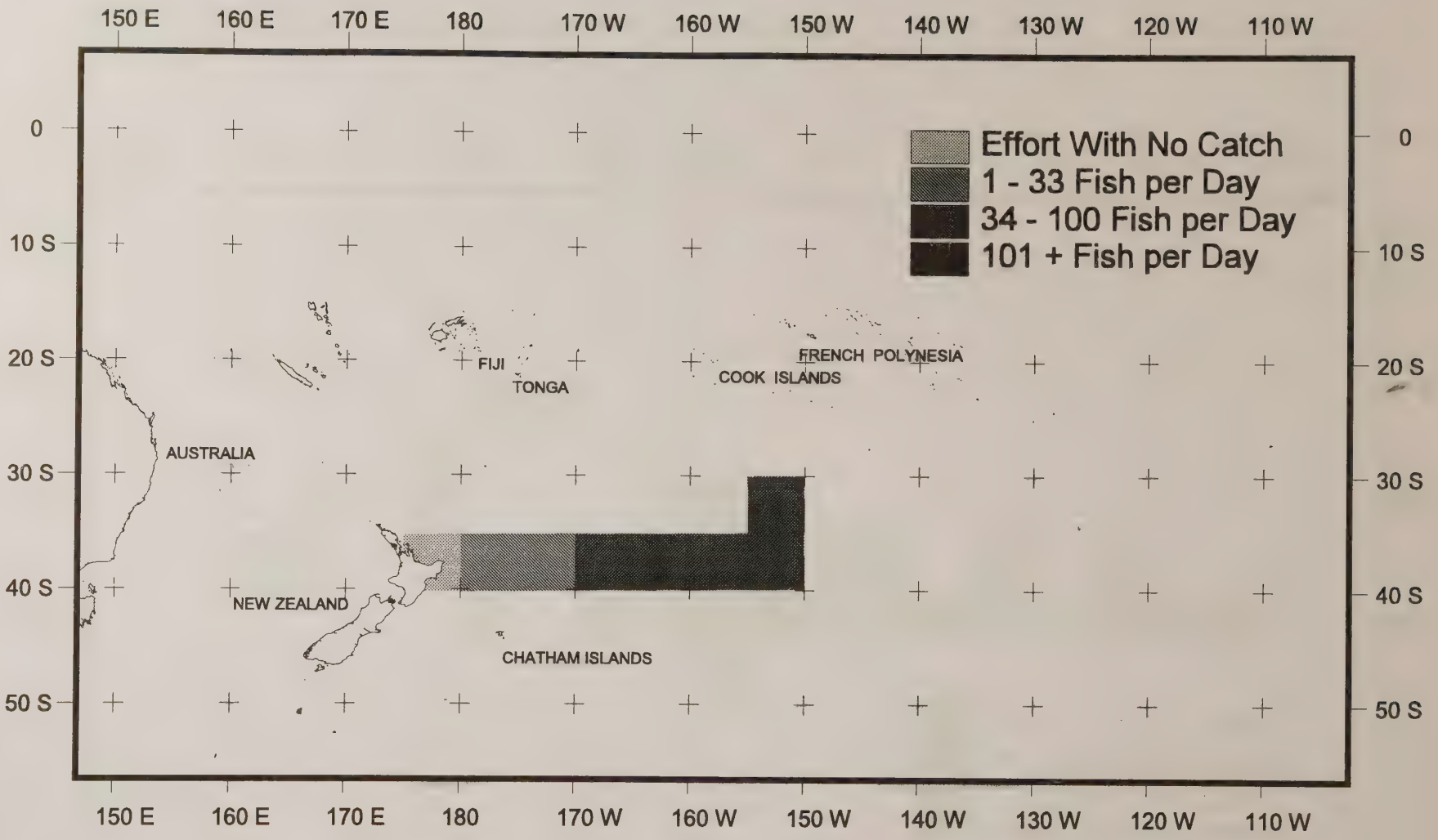

Figure 6c. Distribution of CPUE by U.S. troll vessels in December 1997.

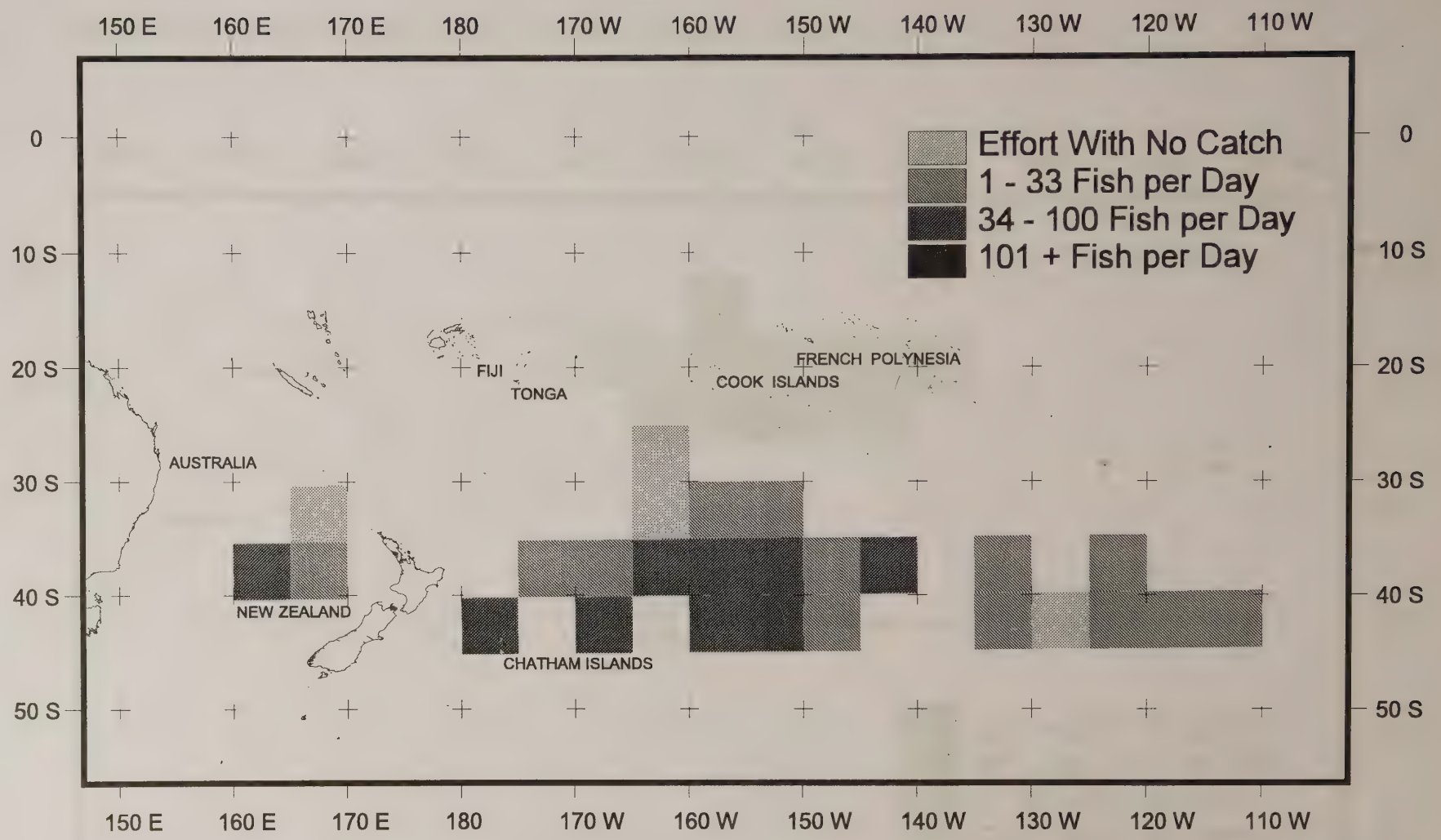

Figure 6d. Distribution of CPUE by U.S. troll vessels in January 1998.

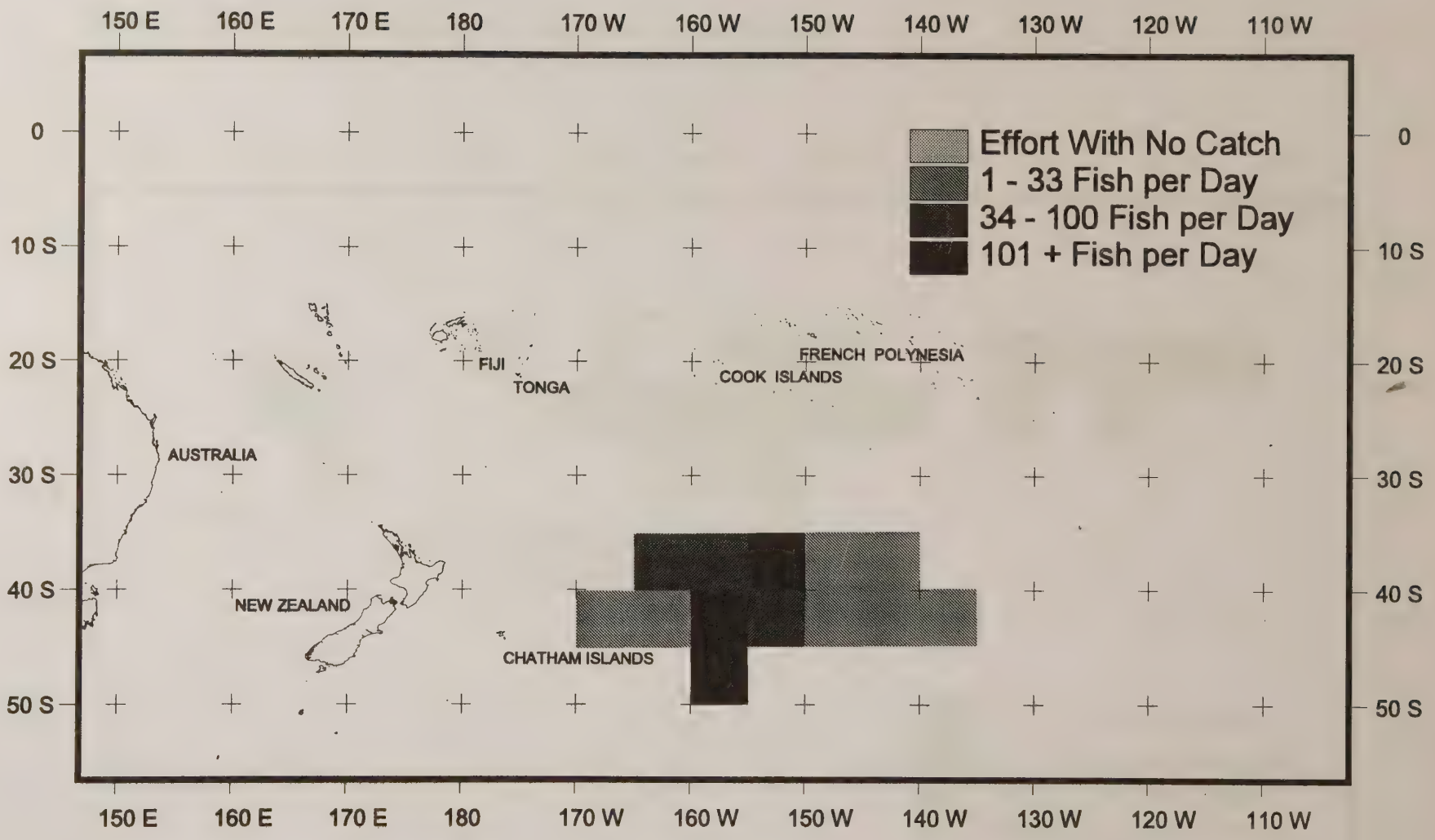

Figure 6e. Distribution of CPUE by U.S. troll vessels in February 1998.

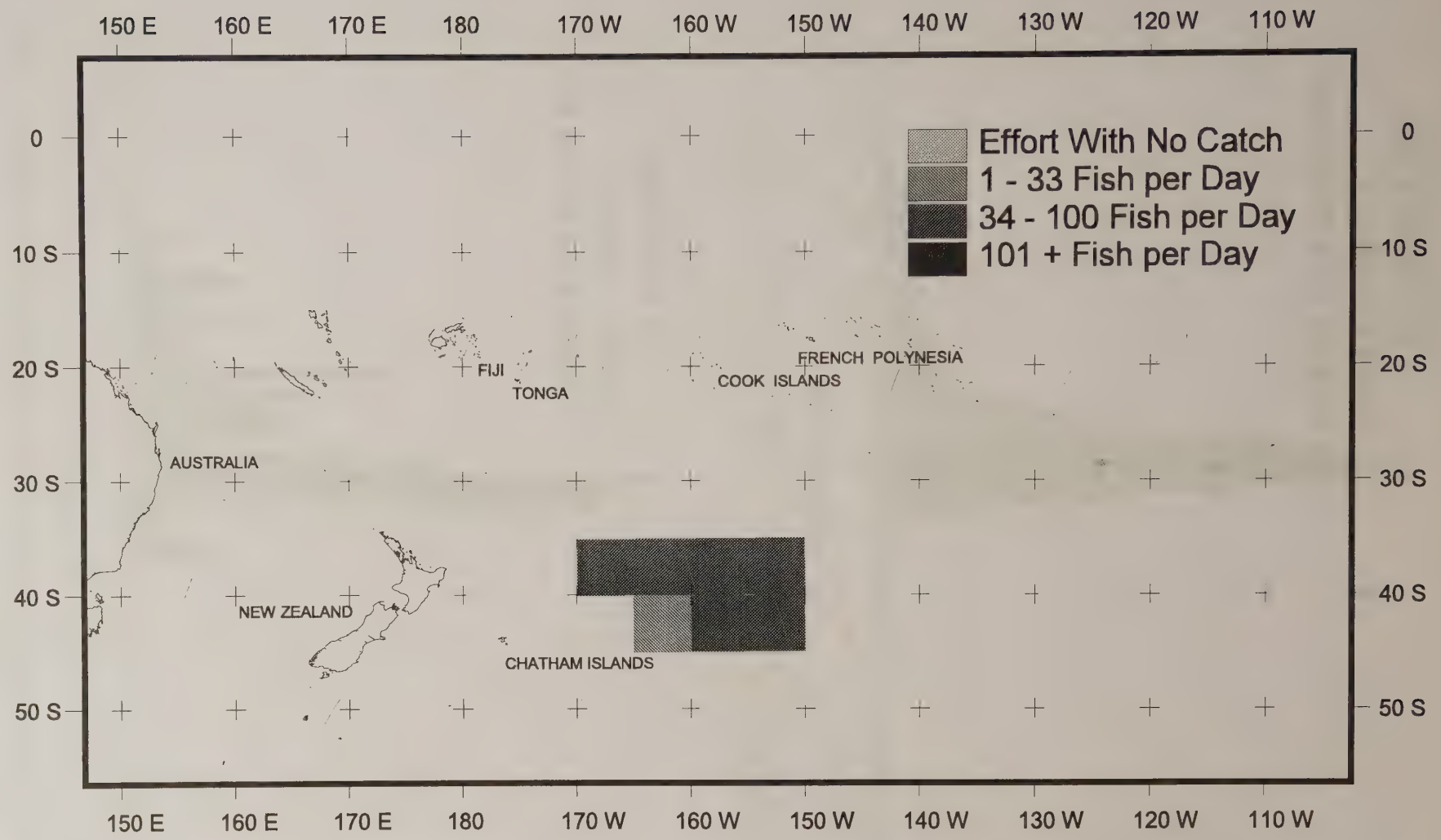

Figure 6f. Distribution of CPUE by U.S. troll vessels in March 1998.

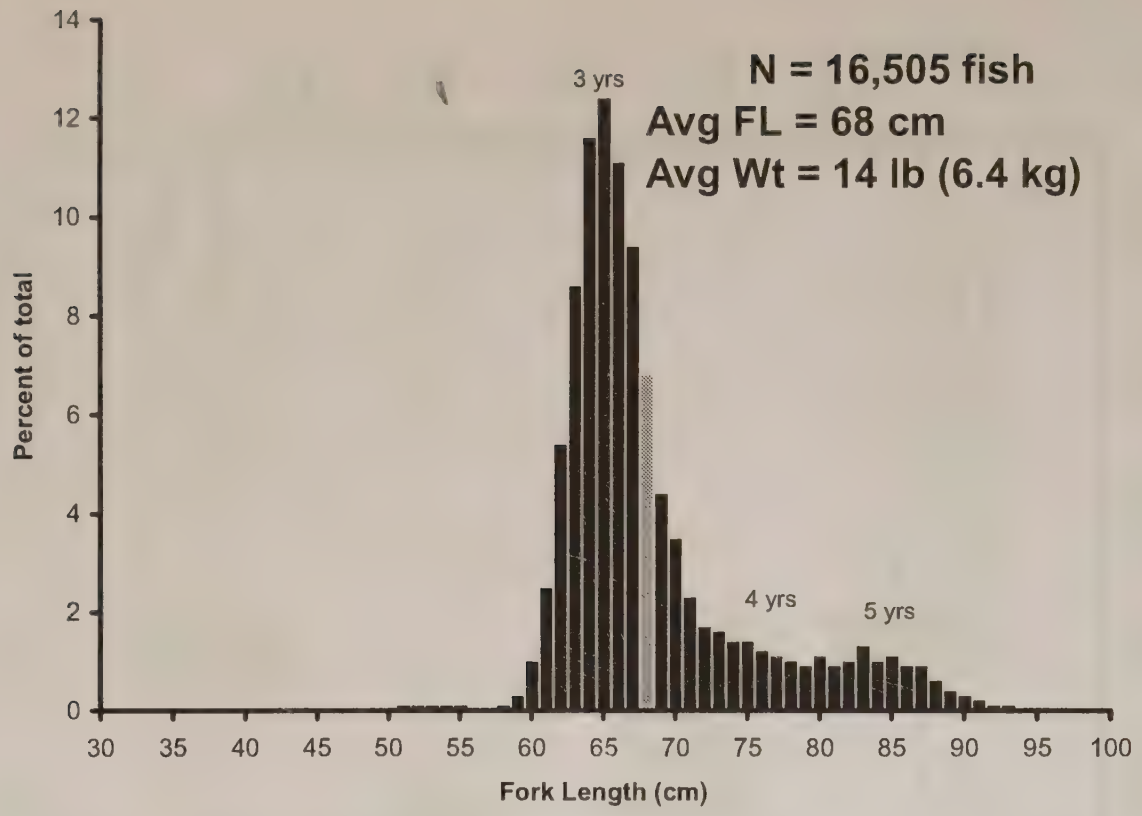

Figure 7. Length-frequency histogram of North Pacific albacore caught in the 1998 U.S. troll fishery.

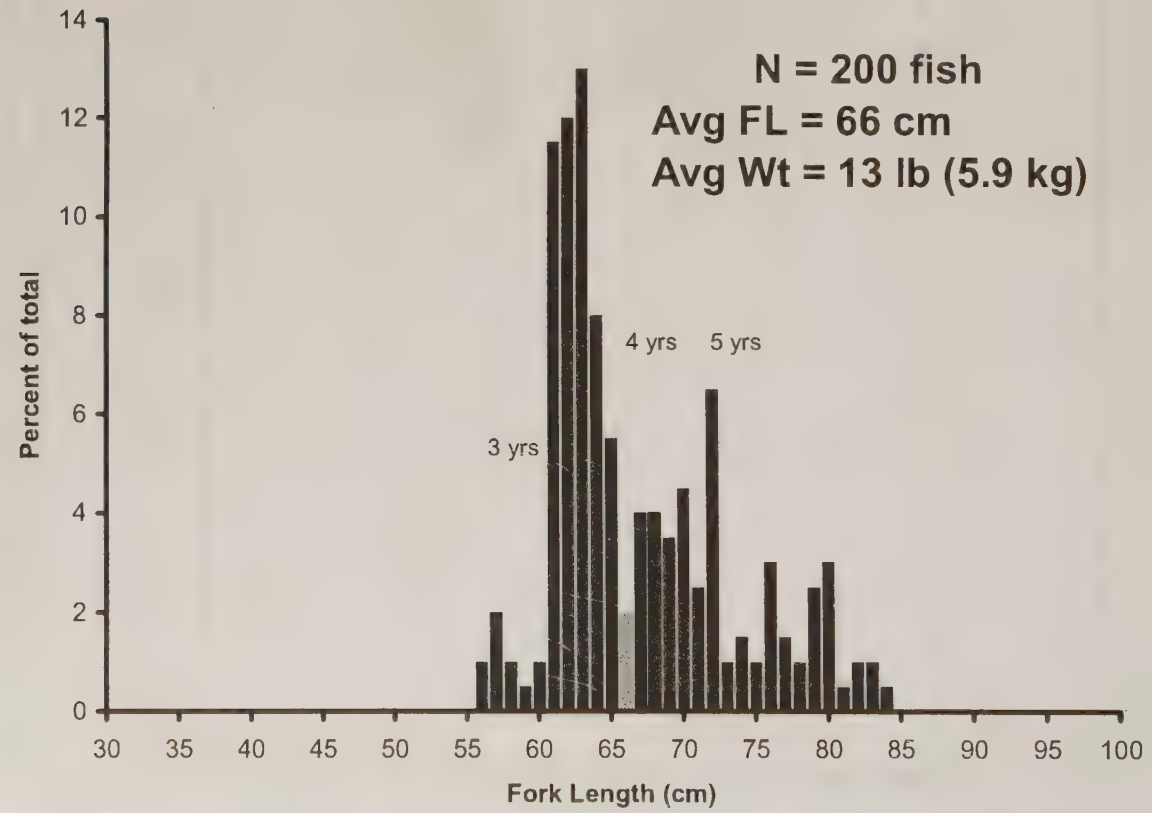

Figure 8. Length-frequency histogram of South Pacific albacore caught in the 1997-1998 U.S. troll fishery.